DIE ALLGEMEINEN JUPITER-STÖRUNGEN

DES

PLANETEN ALEXANDRA

VON

C. A. SCHULTZ-STEINHEIL

LUND 1898
BERLINGSKA BOKTRYCKERI- OCH STILGJUTERI-AKTIEBOLAGET

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AKADEMISK AFHANDLING

SOM MED TILLSTÅND AF
FILOSOFISKA FAKULTETENS I LUND MATEMATISK-NATURVETENSKAPLIGA SEKTION
FÖR FILOSOFIE DOKTORSGRADS VINNANDE
OFFENTLIGEN FÖRSVARAS

AF

C. A. SCHULTZ-STEINHEIL
FILOSOFIE LICENTIAT

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LUND 1898
BERLINGSKA BOKTRYCKERI- OCH STILGJUTERI-AKTIEBOLAGET

Der Planet Alexandra (54) wurde im Herbste 1858 in Paris entdeckt. Die Berechnungen von Elementen sowie von Opositions-Ephemeriden für Berliner Jahrbuch wurden in allen Jahren von meinem Vater weiland Prof. H. Schultz ausgeführt; für Evaluirung der Störungen war dabei mekanische Quadratur angewandt worden. Schon während des Siebziger war es die Absicht meines Vaters allgemeine Störungen zu berechnen, und als Einleitung publicirte er im Jahre 1875 in: Bihang till Kungl. Svenska Akad. Handl. Band 3 N:o 8 "Normalorter och oskulerande element för planeten Alexandra (54)", wo eine Übersicht der vorher ausgeführten Rechnungen nebst revidirten Normalörtern und die oskulirenden Elemente, welche als Grund der allgemeinen Störungen angenommen sind, sich vorfinden. Andere Arbeiten bewirkten doch, dass die allgemeine Störungsrechnung erst im Jahre 1889 angefangen wurde, und als mein Vater im Anfange des Jahres 1890 nach einer längeren Krankheit starb, war die Rechnung nicht weit fortgerückt. Da mein Vater also nie Gelegenheit hatte allgemeine Störungen des Planeten Alexandra, dem er so viel Zeit gewidmet hatte, zu berechnen, habe ich es angemessen gefunden diese Störungsrechnung auszuführen. Zwei Metoden standen mir dabei zur Verfügung. Sowohl die Hansen'sche wie die Gyldén'sche hatten beide ihre Vorzüge. Nach längerem Sinnen entschloss ich mich die letzte zu wählen, teils weil da keine Glieder proportional der Zeit vorkommen, teils weil in Folge der nahen Kommensurabilität zwischen den mittleren Bewegungen von dem Jupiter und der Alexandra die Hansen'sche Teorie, die nach Potenzen der Massen entwickelt, keine gute Approximation geben kann. Nachdem ich ziemlich weit in der Rechnung gekommen war, fand ich doch dass, wenigstens auf dem Wege, den ich eingeschlagen hatte, es fast unmöglich war zu Resultat zu kommen, da

in Folge des grossen Betrages von sowohl Excentricität wie Neigung die Reihen sehr schlecht konvergirten und die Arbeit dadurch sehr vergrössert wurde; auch andere Umstände machten, dass die Rechnung sehr unsicher ausfiel. Ich beschloss daher diese Arbeit abzubrechen und die Störungen nach der Hansen'schen Metode zu evaluiren, um nachher die abgebrochene Rechnung wieder aufzunehmen und eine Metode finden zu suchen mit deren Hülfe bessere Konvergenz und sichere Resultate zu erreichen war. Das Resultat, welches ich hier liefere, sind die Jupiterstörungen erster Ordnung.

1.

Die Elemente des Planeten Alexandra (System VII) oskuliren für die Epoche 1858 Dec. 30,0 Berliner M. Z.

Mittlere Anomalie	$c = 52^\circ\ 11'\ 19,''7$	
Länge des Perihels	$\pi = 294\ 16\ 3,3$	M. Equ.
Knotenlänge	$\theta = 313\ 49\ 25,8$	1858
Neigung	$i = 11\ 46\ 58,7$	Dec. 30,0
Excentr. Winkel	$\varphi = 11\ 27\ 35,7$	
log der halben grossen Achse	$\lg a = 0.4328648$	
M. tägl. sid. Bewegung . . .	$n = 795,''62672$	

Die Jupiterselemente für dieselbe Epoche und Oskulationsepoche sind den Annalen der Pariser Sternwarte Memoires T. XII Sect. V. entnommen und sind dabei nur die sekuläre Störungen und die grosse Ungleichheit in der Rechnung mitgenommen.

$c' = 61^\circ\ 0'\ 20,''1$		
$\pi' = 12\ 23\ 13,7$	M. Equ.	
$\theta' = 99\ 1\ 44,0$	1858	
$i' = 1\ 18\ 39,5$	Dec. 30,0	
$\varphi' = 2\ 46\ 50,8$		
$\lg a' = 0,7162473$		
$n' = 299,''11815$		

Die Jupiters-Masse $m' = \frac{1}{1047,89}$

$$\log \mu = \log \frac{n'}{n} = 9.5751334 \quad \mu = 0,3759529$$

Man bekommt also:

μ	= 0.3759529	9μ	= 3.38358
2μ	0.7519058	10μ	3.75953
3μ	1.1278587	11μ	4.13548
4μ	1.5038116	12μ	4.51143
5μ	1.8797645	13μ	4.88739
6μ	2.2557174	14μ	5.26334
7μ	2.6316703	15μ	5.63929
8μ	3.0076232	16μ	6.01525

Der kleinste Divisor kommt beim Argument $3 - 8\mu$ vor, wo

$$3 - 8\mu = -0.0076232.$$

Übrigens ist zu bemerken, dass

$$1 - 3\mu = -0.1278587$$
$$2 - 5\mu = +0.1202355.$$

Diese Argumente sind zwar nicht so klein; da sie aber von niedrigem Grade sind, haben sie doch eine nicht unbeträchtige Bedeutung. Der nächste kleine Divisor kommt beim Argumente $6 - 16\mu$ vor.

$$6 - 16\mu = -0.01525.$$

Da dies Glied von hohem Grade ist, kann es doch hier nicht sehr merkbar werden.

In Folge der kleinen Divisoren sind die Koeffizienten zu den folgenden Argumenten genauer berechnet:

$0 - 3\mu$	$1 - 5\mu$	$2 - 8\mu$
$1 - 3\mu$	$2 - 5\mu$	$3 - 8\mu$
$2 - 3\mu$	$3 - 5\mu$	$4 - 8\mu$.

2.

Die meisten Formeln, die ich im Folgenden angewandt habe, sind ganz identisch mit den von Hansen in seiner Abhandlung "Ausereinandersetzung etc." *) angegebenen; ich teile sie doch der Vollständigkeit wegen nach und nach mit ohne Hansen jedesmal zu citiren.

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*) Ausereinandersetzung einer zweckmässigen Metode zur Berechnung der absoluten Störungen der kleinen Planeten von P. A. Hansen.

Aus den gleichungen

$$\sin\frac{1}{2}I\sin\frac{1}{2}(\Psi+\Phi)=\sin\frac{1}{2}(\theta-\theta')\sin\frac{1}{2}(i+i')$$

$$\sin\frac{1}{2}I\cos\frac{1}{2}(\Psi+\Phi)=\cos\frac{1}{2}(\theta-\theta')\sin\frac{1}{2}(i-i')$$

$$\cos\frac{1}{2}I\sin\frac{1}{2}(\Psi-\Phi)=\sin\frac{1}{2}(\theta-\theta')\cos\frac{1}{2}(i+i')$$

$$\cos\frac{1}{2}I\cos\frac{1}{2}(\Psi-\Phi)=\cos\frac{1}{2}(\theta-\theta')\cos\frac{1}{2}(i-i')$$

$$\Pi=\pi-\theta-\Phi;\quad \Pi'=\pi'-\theta'-\Psi$$

bekommt man folgende Werte:

$$\begin{aligned}
\Psi &= 211^\circ\,30'\,53'',25\\
\Phi &= -3\;21\;26,73\\
I &= 12\;52\;51,52\\
\Pi &= 343\;48\;\;4,23\\
\Pi' &= 61\;50\;36,45
\end{aligned}$$

Als Kontrolle dienen die Gleichungen:

$$\sin\Phi\sin i=\sin\Psi\sin i'$$

$$\sin(\theta-\theta')\sin i=\sin\Psi\sin I$$

$$\operatorname{tang}\frac{1}{2}I=\operatorname{tang}\frac{1}{2}(i-i')\,\frac{\cos\frac{1}{2}(\Psi-\Phi)}{\cos\frac{1}{2}(\Psi+\Phi)}.$$

Für die Berechnung von $\left(\frac{\Delta}{a}\right)^2$ sind folgende Gleichungen angewandt worden:

$$\alpha=\frac{a'}{a}\qquad \begin{aligned} k\sin K&=\cos I\sin\Pi' \qquad & k_1\sin K_1&=\sin\Pi'\\ k\cos K&=\cos\Pi' \qquad & k_1\cos K_1&=\cos I\cos\Pi'\end{aligned}$$

$$p\sin P=2\,\alpha^2\,\frac{e'}{e}-2\,\alpha\,k\cos(\Pi-K)$$

$$p\cos P=2\,\alpha\cos\varphi' k_1\sin(\Pi-K_1)$$

$$v\sin V=2\,\alpha\cos\varphi k\sin(\Pi-K)$$

$$v\cos V=2\,\alpha\cos\varphi\cos\varphi' k_1\cos(\Pi-K_1)$$

$$w \sin W = p - 2\,a^2 \frac{e'}{e} \sin P$$
$$w \cos W = v \cos (V - P)$$
$$w_1 \sin W_1 = v \sin (V - P)$$
$$w_1 \cos W_1 = 2\,a^2 \frac{e'}{e} \cos P$$
$$f \sin (F - P) = w \sin (\varepsilon + W) - ep$$
$$f \cos (F - P) = w_1 (\varepsilon + W_1)$$
$$R = 1 + a^2 - 2a^2 e'^2$$
$$\gamma_0 = R - 2e \cos \varepsilon + e^2 \cos^2 \varepsilon + e'f \cos F$$
$$\gamma_2 = a^2 e'^2 \qquad D = \gamma_0 + \frac{1}{2}\gamma_2$$

wodurch man die Koeffizienten in der Entwickelung von $\left(\frac{\Delta}{a}\right)^2$ bekommt.

Als Resultat dieser Rechnung habe ich folgende Werte bekommen:

$$K = 61^\circ\,13'\,53'',95 \qquad \log k = 9.9914453$$
$$K_1 = 62\;26\;48{,}01 \qquad \log k_1 = 9.9975837$$
$$\log a = 0.2833825$$
$$P = 165\;17\;48{,}92 \qquad \log p = 0.5873595$$
$$V = 281\;32\;56{,}55 \qquad \log v = 0.5654597$$
$$W = 115\;29\;55{,}90 \qquad \log w = 0.5772319$$
$$W_1 = 117\;50\;48{,}27 \qquad \log w_1 = 0.5716320$$
$$\log R = 0.6693560 \qquad \log \gamma_2 = 7.9385112$$

Den Umkreis habe ich in 24 gleichen Teilen geteilt und demgemäss f, F und D für die Werte von $\varepsilon = 0^\circ, 15^\circ, 30^\circ, 45^\circ$ etc. berechnet.

Ehe die verschiedenen Werte von f, F und D berechnet werden, sind obenstehende Quantitäte auf zwei verschiedene Wege kontrollirt.

Erstens habe ich $\left(\frac{\Delta}{a}\right)^2$ für $\varepsilon = \varepsilon' = 10^\circ$ aus der Gleichung

$$\left(\frac{\Delta}{a}\right)^2 = D - f \cos (\varepsilon' - F) + \frac{1}{2}\gamma_2 \cos 2\varepsilon'$$

evaluirt; zweitens habe ich für dieselben Werte von ε und ε' die Radii Vectores und Anomalia Vera beider Planeten berechnet und aus diesen die geradlinigen Koordinaten und endlich Δ aus der Gleichung

$$\Delta = \sqrt{(x' - x)^2 + (y' - y)^2 + (z' - z)^2}$$

Die Prüfung gab folgende Werte von $\log \frac{\Delta}{a}$:

erste Metode $\lg \frac{\Delta}{a} = 0.2586152$

zweite Metode $\lg \frac{\Delta}{a} = 0.2586153$

ε	$\log f$	$\log D$	$F-\varepsilon$	$\log \sqrt{D+f}$	$\log \sqrt{D-f}$	$\log D$
°			° ′ ″			
0	0.5002608	0.6400926	288 42 3,46	0.4384052	0.0399363	0.6400926
15	0.5179197	0.6455068	290 36 43,19	0.4437059	0.0256482	0.6455068
30	0.5368592	0.6523925	291 49 2,67	0.4497432	0.0104143	0.6523925
45	0.5559856	0.6603597	292 25 22,24	0.4561654	9.9950129	0.6603597
60	0.5747780	0.6690039	292 30 44,12	0.4627357	9.9795642	0.6690039
75	0.5929441	0.6778914	292 7 43,89	0.4692607	9.9637376	0.6778914
90	0.6101502	0.6865454	291 17 0,09	0.4755277	9.9470947	0.6865454
105	0.6258838	0.6944495	289 58 31,17	0.4812742	9.9294701	0.6944495
120	0.6394411	0.7010704	288 12 56,21	0.4861890	9.9113115	0.7010704
135	0.6500003	0.7058978	286 2 31,68	0.4899389	9.8939285	0.7058979
150	0.6567239	0.7084976	283 31 36,95	0.4922059	9.8795964	0.7084976
165	0.6588522	0.7085657	280 46 36,11	0.4927250	9.8713181	0.7085658
180	0.6557776	0.7059748	277 55 48,99	0.4913155	9.8720070	0.7059749
195	0.6471037	0.7008111	275 9 21,87	0.4879086	9.8832420	0.7008111
210	0.6327136	0.6933875	272 39 1,55	0.4825696	9.9043107	0.6933875
225	0.6128694	0.6842389	270 38 7,63	0.4755243	9.9323856	0.6842390
240	0.5883644	0.6740838	269 21 6,61	0.4671828	9.9636118	0.6740838
255	0.5607274	0.6637585	269 2 16,20	0.4581606	9.9942225	0.6637585
270	0.5324083	0.6541242	269 52 55,15	0.4492732	0.0211248	0.6541242
285	0.5067509	0.6459626	271 56 31,96	0.4414705	0.0420530	0.6459626
300	0.4874428	0.6398785	275 3 14,40	0.4356724	0.0555951	0.6398786
315	0.4773433	0.6362389	278 48 1,97	0.4325239	0.0612692	0.6362390
330	0.4772778	0.6351570	282 37 14,88	0.4321912	0.0595734	0.6351570
345	0.4858175	0.6365276	286 0 57,21	0.4343538	0.0518538	0.6365277

Log D in der letzten Kolumne ist eine Kontrolle der zwei vorletzten, welche Kontrolle durch folgende Gleichungen berechnet ist:

$$\sqrt{D^2 - f^2} = p; \qquad D = \sqrt{p^2 + f^2}$$

Als Kontrolle der vorhergehenden Rechnung wird jetzt für $\varepsilon' = 10^0$ und für die verschiedenen Werte von $\varepsilon = 0^0, 15^0, 30^0$ etc. $\left(\frac{\Delta}{a}\right)^2$ auch nach folgendem Formelsysteme berechnet:

$$\left(\frac{\Delta}{a}\right)^2 = \gamma'_0 - f' \cos(\varepsilon - F') + e^2 \cos^2 \varepsilon$$

$$\gamma'_0 = R' - 2\, a^2 e' \cos \varepsilon' + a^2 e'^2 \cos^2 \varepsilon' + e f' \cos F'$$

$$R' = 1 + a^2 - 2e^2$$

$$k' \sin K' = \cos I \sin \Pi \qquad k'_1 \sin K'_1 = \sin \Pi$$

$$k' \cos K' = \cos \Pi \qquad k_1' \cos K_1' = \cos I \cos \Pi$$

$$p' \sin P' = 2\frac{e}{e'} - 2\,a\,k' \cos(\Pi' - K')$$
$$p' \cos P' = 2\,a\,k_1' \cos\varphi \sin(\Pi' - K_1')$$
$$v' \sin V' = 2\,a\,k' \cos\varphi' \sin(\Pi' - K')$$
$$v' \cos V' = 2\,a\,k_1' \cos\varphi' \cos\varphi \cos(\Pi' - K_1')$$

$$w' \sin W' = p' - 2\frac{e}{e'} \sin P' \qquad w_1' \sin W_1' = v' \sin(V' - P')$$

$$w' \cos W' = v' \cos(V' - P') \qquad w_1' \cos W_1' = 2\frac{e}{e'} \cos P'$$

$$f' \sin(F' - P') = w' \sin(\varepsilon' + W') - e'p'$$
$$f' \cos(F' - P') = w_1' \cos(\varepsilon' + W'_1)$$

Folgende Tabelle giebt Kontrolle-Rechnung von $\log\left(\frac{\Delta}{a}\right)^2$ in Einheiten der siebenten Dezimale ausgedrückt.

ε	$K-R$	ε	$K-R$	ε	$K-R$	ε	$K-R$
0^0	0	90^0	−4	180^0	−1	270^0	0
15	+6	105	+8	195	−4	285	−1
30	+4	120	−1	210	−3	300	+1
45	−1	135	−3	225	+1	315	0
60	0	150	−2	240	+2	330	0
75	−7	165	−4	255	−1	345	+5

3.

Für die Rechnung ist jetzt die Hauptsache $[D - f\cos(\varepsilon' - F)]^{-n/2}$ nach *cos* und *sin* der Multipeln von $\varepsilon - \varepsilon'$ für $n = 1, 3, 5$, etc. zu entwickeln. Wenn man nur die ersten Potensen der Massen beabsichtigt, genügt es diese Rechnung für $n = 1, 3, 5, 7$ auszuführen. Diese Rechnung wird mittelst Interpolation ausgeführt und basirt sich auf die Entwicklung

$$[D - f\cos(\varepsilon' - F)]^{-n/2} = a_0^{(n)} + 2\sum_1^\infty a_i^{(n)} \cos i(\varepsilon' - F)$$

wo die Koeffizienten Funktionen der Quantitäten sind, welche in der geschlossenen Funktionsform auf der linken Seite vorkommen. Für die folgende Interpolationsrechnung werden die Koeffizienten in dieser Reihe also numerisch

für die vorher angenommenen 24 aliquoten Teile des Umkreises berechnet. Für jeden der aliquoten Teile der Periferie sollte man also die Koeffizienten $a_i^{(1)}$, $a_i^{(3)}$, $a_i^{(5)}$, $a_i^{(7)}$ berechnen; in der folgenden Rechnung sind aber die in Frage stehenden Entwickelungen mit gewissen Faktoren multiplizirt, so dass man statt dessen bequemer direkt die Koeffizienten β in diesen Entwickelungen

$$\beta_i^{(1)} = \frac{1}{12}\frac{m'}{\sin 1''} a_i^{(1)};\ \beta_i^{(3)} = \frac{1}{12}\frac{a^2 m'}{\sin 1''} a_i^{(3)};\ \beta_i^{(5)} = \frac{1}{12}\frac{a^4 m'}{\sin 1''} a_i^{(5)};\ \beta_i^{(7)} = \frac{1}{12}\frac{a^4 m'}{\sin 1''} a_i^{(7)},$$

wo m' die Jupitersmasse ist, berechnet. Diese Rechnung beginnt mit einer independenten Berechnung von $a_0^{(1)}$ woraus $\beta_0^{(1)}$.

$$a_0^{(1)} = \frac{1}{\text{Med}\,(m,n)}$$

wo $m = \sqrt{D+f}$ und $n = \sqrt{D-f}$ und *Med* (m,n) das aritmetrisch-geometrische Mittel bedeutet.

$$M = \frac{1}{2}(m+n) \qquad N = \sqrt{mn}$$

$$M' = \frac{1}{2}(M+N) \qquad N' = \sqrt{MN}$$

$$M'' = \frac{1}{2}(M'+N') \qquad N'' = \sqrt{M'N'}$$

Die Rechnung wird so weit geführt, bis M und N gleich werden, was dann *Med* (m, n) ist.

Diese Rechnung wird kontrollirt durch

$$\text{tang}\ \varphi = \frac{\sqrt{2f}}{n};\ \sin\varphi' = \text{tg}^2\frac{1}{2}\varphi;\ \sin\varphi'' = \text{tg}^2\frac{1}{2}\varphi'\ \text{etc.}$$

$$a_0^{(1)} = \frac{1}{m}\sqrt{\frac{\cos\varphi'\cos\varphi''\cos\varphi'''\ldots.}{\cos\varphi}}$$

Darnach wird $\beta_0^{(1)} = \frac{1}{12}\frac{m'}{\sin 1''} a_0^{(1)};\ \log\frac{1}{12}\frac{m'}{\sin 1''} = 1.2149282.$

Der Unterschied zwischen Rechnung und Kontrolle betrug nie mehr als eine Einheit in der siebenten Dezimale von $\log a_0^{(1)}$

Die Berechnung der übrigen $\beta_i^{(1)}$ wird folgendermassen ausgeführt (das höchste i wird hier gleich 16 angenommen):

$$\sin\chi = \frac{f}{D}$$

$$p_{16} = \frac{\operatorname{tg}^2 \frac{1}{2}\chi}{4 \cdot 16 \cdot 17}; \quad q_{16} = \frac{33^2 \operatorname{tg}^2 \frac{1}{2}\chi}{4 \cdot 17 \cdot 18}; \quad r_{16} = \frac{3^2 \operatorname{tg}^2 \frac{1}{2}\chi}{4 \cdot 18 \cdot 19}; \quad s_{16} = \frac{35^2 \operatorname{tg}^2 \frac{1}{2}\chi}{4 \cdot 19 \cdot 20}$$

$$\gamma_{16}^{(1)} = \frac{\sec^2 \frac{1}{2}\chi}{1 - \frac{p_{16}(1 - s_{16}) - p_{16} r_{16}}{(1 - q_{16})(1 - s_{16}) - r_{16}}}$$

$$F_{16}^{(1)} = \theta_{16}^{(1)} \sin \chi \quad \text{wo} \quad \theta_i^{(n)} = \frac{2i + n - 2}{4i}$$

$$p_{16}^{(1)} = F_{16}^{(1)} \cdot \gamma_{16}^{(1)}$$

$$\lambda_{16}^{(1)} = \mu_{16}^{(1)} \sin^2 \chi \quad \text{wo} \quad \mu_i^{(n)} = \frac{2i + n - 2}{4i} \cdot \frac{2i - n}{4(i - 1)}$$

$$\gamma_{15}^{(1)} = \frac{1}{1 - \lambda_{16}^{(1)} \gamma_{16}^{(1)}}; \quad F_{15}^{(1)} = \theta_{15}^{(1)} \sin \chi$$

$$p_{15}^{(1)} = F_{15}^{(1)} \cdot \gamma_{15}^{(1)} \text{ etc.}$$

So werden alle $p_i^{(1)}$ berechnet bis $p_1^{(1)}$ wonach

$$\beta_i^{(1)} = \beta_0{}^{(1)} \cdot p_1{}^{(1)} \cdot p_2{}^{(1)} \ldots \ldots p_i^{(1)}$$

ε	$\log \beta_0^{(1)}$	$\log \beta_1^{(1)}$	$\log \beta_2^{(1)}$	$\log \beta_3^{(1)}$	$\log \beta_4^{(1)}$	$\log \beta_5^{(1)}$	$\log \beta_6^{(1)}$	$\log \beta_7^{(1)}$
0°	0.9533858	0.2957837	9.8070809	9.362311	8.937990	8.525529	8.120821	7.72158
15	0.9556763	0.3171798	9.8469022	9.420382	9.014239	8.619918	8.233329	7.85219
30	0.9577732	0.3388696	9.8874183	9.479527	9.091930	8.716114	8.348004	7.98533
45	0.9595799	0.3596408	9.9263387	9.536385	9.166639	8.808627	8.458297	8.11339
60	0.9611944	0.3793253	9.9632424	9.590287	9.237446	8.896294	8.562794	8.23470
75	0.9628585	0.3983324	9.9987012	9.641965	9.305247	8.980166	8.662709	8.35064
90	0.9648624	0.4171539	0.0333996	9.692294	9.371104	9.061498	8.759483	8.46283
105	0.9674274	0.4359565	0.0674535	9.741341	9.435034	9.140254	8.853033	8.57115
120	0.9705955	0.4543173	0.1000085	9.787827	9.495340	9.214323	8.940829	8.67266
135	0.9741436	0.4711043	0.1290995	9.828975	9.548441	9.279321	9.017692	8.76136
150	0.9775396	0.4844750	0.1516980	9.860603	9.589014	9.328796	9.076042	8.82857
165	0.9799973	0.4920754	0.1640409	9.877583	9.610585	9.354933	9.106732	8.86381
180	0.9806983	0.4915589	0.1624026	9.874848	9.606764	9.350033	9.100756	8.85675
195	0.9791346	0.4813419	0.1441956	9.848827	9.573004	9.308573	9.051620	8.79996
210	0.9753893	0.4612716	0.1089750	9.798767	9.508236	9.229167	8.957616	8.69138
225	0.9701103	0.4327223	0.0586710	9.727107	9.415389	9.115221	8.822622	8.53537
240	0.9642259	0.3982230	9.9971940	9.639081	9.300994	8.974549	8.655730	8.34230
255	0.9586267	0.3610309	9.9299658	9.542222	9.174673	8.818854	8.470712	8.12799
270	0.9539819	0.3249230	9.8637229	9.446188	9.048990	8.663596	8.285922	7.91369
285	0.9506904	0.2940385	9.8062536	9.362394	8.938979	8.527422	8.123617	7.72528
300	0.9489027	0.2723461	9.7653044	9.302354	8.859917	8.429374	8.006602	7.58931
315	0.9485589	0.2625326	9.7463083	9.274249	8.822734	8.383127	7.951301	7.52496
330	0.9494325	0.2648858	9.7500973	9.279462	8.829367	8.391177	7.960768	7.53584
345	0.9511767	0.2771765	9.7726115	9.312117	8.872128	8.444028	8.023698	7.60885

ε	$\log \beta_8^{(1)}$	$\log \beta_9^{(1)}$	$\log \beta_{10}^{(1)}$	$\log \beta_{11}^{(1)}$	$\log \beta_{12}^{(1)}$	$\log \beta_{13}^{(1)}$	$\log \beta_{14}^{(1)}$	$\log \beta_{15}^{(1)}$	$\log \beta_{16}^{(1)}$
0°	7.32640	6.93437	6.54483	6.1573	5.7715	5.3872	5.0040	4.6219	4.2407
15	7.47511	7.10117	6.72972	6.3603	5.9926	5.6263	5.2612	4.8972	4.5341
30	7.62671	7.27121	6.91820	6.5672	6.2179	5.8701	5.5234	5.1778	4.8331
45	7.77251	7.43475	7.09948	6.7662	6.4347	6.1045	5.7756	5.4477	5.1208
60	7.91062	7.58966	7.27117	6.9547	6.6399	6.3265	6.0144	5.7033	5.3931
75	8.04257	7.73761	7.43512	7.1346	6.8358	6.5385	6.2423	5.9472	5.6529
90	8.17018	7.88061	7.59351	7.3084	7.0250	6.7430	6.4622	6.1824	5.9036
105	8.29326	8.01844	7.74608	7.4757	7.2070	6.9397	6.6737	6.4086	6.1445
120	8.40845	8.14731	7.88862	7.6319	7.3769	7.1233	6.8709	6.6195	6.3690
135	8.50898	8.25967	8.01279	7.7679	7.5247	7.2828	7.0422	6.8026	6.5639
150	8.58504	8.34456	8.10651	7.8705	7.6360	7.4030	7.1712	6.9405	6.7106
165	8.62481	8.38886	8.15535	7.9238	7.6939	7.4655	7.2382	7.0119	6.7866
180	8.61669	8.37967	8.14508	7.9125	7.6815	7.4520	7.2236	6.9963	6.7699
195	8.55224	8.30758	8.06535	7.8251	7.5865	7.3494	7.1134	6.8784	6.6444
210	8.42911	8.16991	7.91315	7.6584	7.4053	7.1536	6.9031	6.6535	6.4051
225	8.25211	7.97194	7.69422	7.4185	7.1445	6.8718	6.6004	6.3300	6.0605
240	8.03287	7.72655	7.42270	7.1209	6.8207	6.5220	6.2244	5.9280	5.6324
255	7.78930	7.45373	7.12064	6.7896	6.4602	6.1322	5.8055	5.4798	5.1550
270	7.54552	7.18047	6.81792	6.4574	6.0986	5.7412	5.3850	5.0298	4.6756
285	7.33100	7.93987	6.55124	6.1646	5.7797	5.3963	5.0140	4.6328	4.2525
300	7.17609	6.76602	6.35845	5.9529	5.5491	5.1467	4.7455	4.3454	3.9462
315	7.10270	6.68358	6.26698	5.8524	5.4395	5.0281	4.6179	4.2087	3.8005
330	7.11499	6.69729	6.28210	5.8689	5.4575	5.0475	4.6387	4.2309	3.8241
345	7.19807	6.79043	6.38530	5.9822	5.5808	5.1809	4.7821	4.3844	3.9877

Alle jetzt berechneten β sind Koeffizienten in der Reihe

$$\frac{1}{12}\frac{m'}{\sin 1''}[D - f\cos(\varepsilon' - F)]^{-1/2} = \beta_0^{(1)} + 2\beta_1^{(1)}\cos(\varepsilon' - F) + 2\beta_2^{(1)}\cos 2(\varepsilon' - F) + \ldots.$$

Setzt man hier $\varepsilon' - F = 0$, so muss die Gleichung

$$\frac{1}{12}\frac{m'}{\sin 1''}[D - f]^{-1/2} - (\beta_0^{(1)} + 2\beta_1^{(1)} + 2\beta_2^{(1)} + \ldots) = 0$$

nahe satisfiirt sein, welche Gleichung ich als Kontrolle angewandt habe.

Die Abweichung von Null ist hier unten in Einheiten der fünften Dezimale angegeben.

ε	*Abw.*	ε	*Abw.*	ε	*Abw.*	ε	*Abw.*
0°	+ 1	90°	+ 18	180°	+ 172	270°	+ 1
15	+ 1	105	+ 33	195	+ 125	285	0
30	+ 1	120	+ 60	210	+ 66	300	+ 2
45	+ 3	135	+ 101	225	+ 27	315	0
60	+ 5	150	+ 148	240	+ 9	330	0
75	+ 9	165	+ 182	255	+ 2	345	+ 1

Alle $\beta_i^{(1)}$ von $\beta_1^{(1)}$ bis $\beta_{16}^{(1)}$ werden auch Kontrollirt, wenn man nur $\beta_{16}^{(1)}$ prüft. Dies wird mit folgenden Formeln ausgeführt:

$$E = \frac{1}{12}\frac{m'}{\sin 1''}\cdot\frac{1\cdot 3\cdot 5\ldots 31}{2\cdot 4\cdot 6\ldots 32}\cdot\frac{\operatorname{tg}^{16}\frac{1}{2}\chi}{(D\cos\chi)^{1/2}}$$

$$\beta_{16}^{(1)} = E\left\{1 - [8.468521]\,G + [7.56543]\,G^2 - [6.9065]\,G^3 + \ldots\right\}$$

wo

$$G = \frac{\sin^2 \frac{1}{2}\chi}{2\cos\chi}$$

Differenz Rechnung–Kontrolle von $\log \beta_{16}^{(1)}$ ist hier unten in Einheiten der siebenten Dezimale angegeben.

ε	$R-K$	ε	$R-K$	ε	$R-K$	ε	$R-K$
0^0	+11	90^0	+17	180^0	+26	270^0	+ 6
15	+10	105	−15	195	+12	285	0
30	+ 2	120	− 3	210	− 8	300	− 1
45	− 4	135	+22	225	− 1	315	− 6
60	0	150	+24	240	+13	330	+ 9
75	−11	165	−11	255	+15	345	−23

Nach dem alle $\beta_i^{(1)}$ berechnet sind, werden $\beta_i^{(3)}$ durch eine independente Rechnung evaluirt, indem wir doch $\beta_0^{(1)}$ aus dem Vorigen als bekannt voraussetzen; zu dem Zwecke haben wir ein Formelsystem dem vorigen analog:

$$\gamma_{16}^{(3)} = \frac{\sec^2 \frac{1}{2}\chi}{1 - \dfrac{p_{16}(1-s_{16}) - p_{16}\,r_{16}}{(1-q_{16})(1-s_{16}) - r_{16}}}$$

wo

$$p_{16} = -\frac{3}{64\,.\,17}\,\mathrm{tg}^2\,\frac{1}{2}\chi; \quad q_{16} = \frac{35\,.\,31}{4\,.\,17\,.\,18}\,\mathrm{tg}^2\,\frac{1}{2}\chi$$

$$r_{16} = \frac{5}{4\,.\,18\,.\,19}\,\mathrm{tg}^2\,\frac{1}{2}\chi; \quad s_{16} = \frac{37\,.\,33}{4\,.\,19\,.\,20}\,\mathrm{tg}^2\,\frac{1}{2}\chi$$

$$F_{16}^{(3)} = \theta_{16}^{(3)} \sin\chi \qquad p_{16}^{(3)} = F_{16}^{(3)}\,.\,\gamma_{16}^{(3)}$$

$$\lambda_{16}^{(3)} = \mu_{16}^{(3)}\,.\,\sin^2\chi \qquad \gamma_{15}^{(3)} = \frac{1}{1 - \lambda_{16}^{(3)}\,.\,\gamma_{16}^{(3)}}$$

$$F_{15}^{(3)} = \theta_{15}^{(3)} \sin\chi \qquad p_{15}^{(3)} = F_{15}^{(3)}\,.\,\gamma_{15}^{(3)} \text{ etc.}$$

So werden successive alle $p_i^{(3)}$ berechnet bis $p_1^{(3)}$

$$\beta_0^{(3)} = a^2\,.\,\frac{\beta_0^{(1)}}{D - f\,p_1^{(3)}}.$$

$$\beta_i^{(3)} = \beta_0^{(3)}\,.\,p_1^{(3)}\,.\,p_2^{(3)}\,.\,\ldots\,.\,p^{(3)}$$

ε	$\log \beta^{(3)}_0$	$\log \beta^{(3)}_1$	$\log \beta^{(3)}_2$	$\log \beta^{(3)}_3$	$\log \beta^{(3)}_4$	$\log \beta^{(3)}_5$	$\log \beta^{(3)}_6$	$\log \beta^{(3)}_7$
0°	1.1281351	0.9066189	0.6253078	0.3192368	9.9995263	9.6711571	9.3367962	8.9980402
15	1.1476044	0.9415185	0.6772592	0.3887112	0.0867265	9.7761893	9.4597231	9.1389018
30	1.1681376	0.9775437	0.7305626	0.4598189	0.1758668	9.8834821	9.5852393	9.2826870
45	1.1887637	1.0128190	0.7823398	0.5286522	0.2619983	9.9870398	9.7062992	9.4212979
60	1.2095414	1.0472133	0.8322337	0.5946178	0.3442876	0.0857867	9.8215835	9.5531712
75	1.2312997	1.0817035	0.8813740	0.6590007	0.4241763	0.1813218	9.9328492	9.6802218
90	1.2550955	1.1175084	0.9311539	0.7233731	0.5034181	0.2755819	0.0422170	9.8047553
105	1.2815382	1.1552102	0.9821127	0.7882278	0.5824579	0.3689631	0.1500340	9.9270696
120	1.3101323	1.1940215	1.0330995	0.8520276	0.6593622	0.4591305	0.2535606	0.0440182
135	1.3387517	1.2312799	1.0807725	0.9107036	0.7293128	0.5405043	0.3464482	0.1484790
150	1.3633773	1.2622443	1.1194555	0.9575693	0.7845771	0.6042862	0.4188204	0.2294894
165	1.3785140	1.2805901	1.1417356	0.9840301	0.8153339	0.6394027	0.4583358	0.2734294
180	1.3787591	1.2800792	1.1402961	0.9816032	0.8118921	0.6349307	0.4528242	0.2668721
195	1.3612194	1.2571005	1.1106673	0.9449144	0.7679519	0.5836335	0.3941053	0.2006888
210	1.3273589	1.2126751	1.0534655	0.8741999	0.6833840	0.4850253	0.2813428	0.0736972
225	1.2825657	1.1521743	0.9742740	0.7753485	0.5644301	0.3457283	0.1215568	9.8933269
240	1.2339144	1.0832475	0.8816797	0.6580159	0.4218777	0.1776970	9.9278907	9.6739248
255	1.1878874	1.0137277	0.7852711	0.5336778	0.2691497	9.9963336	9.7177454	9.4349029
270	1.1492052	0.9506251	0.6947161	0.4147661	0.1214867	9.8197111	9.5120398	9.2000347
285	1.1206473	0.8999057	0.6194472	0.3142512	9.9954254	9.6679460	9.3344779	8.9966165
300	1.1033214	0.8662052	0.5677971	0.2441995	9.9077787	9.5606034	9.2083800	8.8517255
315	1.0970006	0.8519888	0.5449771	0.2125745	9.8662629	9.5111522	9.1499673	8.7843346
330	1.1004315	0.8566578	0.5509931	0.2199684	9.8750479	9.5213351	9.1615521	8.7973238
345	1.1116144	0.8766183	0.5805260	0.2593000	9.9242746	9.5805071	9.2306988	8.8764640

ε	$\log \beta^{(3)}_8$	$\log \beta^{(3)}_9$	$\log \beta^{(3)}_{10}$	$\log \beta^{(3)}_{11}$	$\log \beta^{(3)}_{12}$	$\log \beta^{(3)}_{13}$	$\log \beta^{(3)}_{14}$	$\log \beta^{(3)}_{15}$	$\log \beta^{(3)}_{16}$
0°	8.6559213	8.311146	7.964219	7.615513	7.265313	6.91384	6.56126	6.20773	5.85336
15	8.8147448	8.487951	8.159019	7.828320	7.496134	7.16268	6.82813	6.49263	6.15629
30	8.9768300	8.668358	8.357765	8.045416	7.731590	7.41650	7.10033	6.78321	6.46525
45	9.1330253	8.842161	8.549194	8.254483	7.958307	7.66088	7.36237	7.06292	6.76264
60	9.2815227	9.007308	8.731008	8.452980	8.173496	7.89277	7.61097	7.32823	7.04467
75	9.4243955	9.166030	8.905598	8.643454	8.379865	8.11504	7.84915	7.58234	7.31470
90	9.5641345	9.321003	9.075827	8.828953	8.580649	8.33112	8.08053	7.82902	7.57670
105	9.7009883	9.472426	9.241843	9.009579	8.775898	8.54100	8.30506	8.06820	7.83053
120	9.8314024	9.616337	9.399273	9.180548	8.960418	8.73909	8.51671	8.29343	8.06935
135	9.9474775	9.744056	9.538658	9.331615	9.123182	8.91356	8.70290	8.49134	8.27898
150	0.0371592	9.842433	9.645749	9.447433	9.247737	9.04686	8.84495	8.64215	8.43856
165	0.0855417	9.895271	9.703052	9.509208	9.313991	9.11759	8.92018	8.72187	8.52277
180	0.0779344	9.886611	9.693336	9.498435	9.302159	9.10470	8.90623	8.70685	8.50669
195	0.0042572	9.805418	9.604612	9.402168	9.198338	8.99332	8.78728	8.58033	8.37259
210	9.8629847	9.649827	9.434675	9.217863	8.999650	8.78024	8.55978	8.33842	8.11626
225	9.6619643	9.428110	9.192225	8.954654	8.715660	8.47545	8.23418	7.99200	7.74901
240	9.4167566	9.157047	8.895269	8.631777	8.366840	8.10067	7.83343	7.56526	7.29627
255	9.1487934	8.860096	8.569297	8.276757	7.982752	8.68750	7.39116	7.09388	6.79578
270	8.8847085	8.566756	8.246673	7.924827	7.601500	8.27691	6.95123	6.62459	6.29713
285	8.6553935	8.311515	7.965485	7.617678	7.268375	6.91780	6.56612	6.21349	5.86002
300	8.4916837	8.128968	7.764088	7.397420	7.029249	6.65980	6.28924	5.91773	5.54537
315	8.4153033	8.043590	7.669707	7.294031	6.916849	6.53838	6.15881	5.77828	5.39690
330	8.4296987	8.059393	7.686918	7.312651	6.936878	6.55982	6.18166	5.80254	5.42257
345	8.5188451	8.158555	7.796102	7.431861	7.066120	6.69910	6.33097	5.96189	5.59196

Als Kontrolle dieser Rechnung bekommt man analog wie für $\beta^{(1)}_i$

$$\frac{1}{12}\frac{a^2 m'}{\sin 1''}[D-f]^{-3/2} - [\beta^{(3)}_0 + 2\,\beta^{(3)}_1 + 2\,\beta^{(3)}_2 + \ldots .] = 0$$

Die Abweichungen sind in Einheiten der vierten Dezimale angegeben.

ε	*Abw.*	ε	*Abw.*	ε	*Abw.*	ε	*Abw.*
0^0	+ 1	90^0	+ 94	180^0	+1081	270^0	+ 4
15	+ 2	105	+ 183	195	+ 760	285	+ 1
30	+ 6	120	+ 344	210	+ 387	300	0
45	+12	135	+ 596	225	+ 147	315	+ 1
60	+23	150	+ 908	240	+ 46	330	+ 1
75	+47	165	+1133	255	+ 12	345	+ 1

Die für die Kontrolle von $\beta_{16}^{(1)}$ angewandte Reihe konvergirt für $\beta_{16}^{(3)}$ schlecht und die Berechnung ist daher mühsam und wenig anwendbar. Als zweite Kontrolle können wir die Koefficienten $\beta_i^{(1)}$ von $i = 1$ bis $i = 15$ aus den oben berechneten $\beta_i^{(3)}$ evaluiren gemäss der Formel:

$$\beta_i^{(1)} = \frac{1}{4a^2} \cdot \frac{f}{i} [\beta_{i-1}^{(3)} - \beta_{i+1}^{(3)}]$$

Die so gefundenen $\log \beta_i^{(1)}$ differiren von den vorher berechneten nie mehr als mit ein paar Einheiten in der siebenten Dezimale.

Die $\beta_i^{(5)}$ werden folgendermassen berechnet. Erst evaluirt man $\beta_0^{(5)}$ und $\beta_1^{(5)}$ aus den folgenden Gleichungen:

$$\beta_0^{(5)} + \beta_1^{(5)} = a^2 \cdot \frac{\beta_0^{(3)} + {}^1/_3 \beta_1^{(3)}}{D - f}$$

$$\beta_0^{(5)} - \beta_1^{(5)} = a^2 \cdot \frac{\beta_0^{(3)} - {}^1/_3 \beta_1^{(3)}}{D + f}$$

und dann die übrigen $\beta_i^{(5)}$ aus:

$$\beta_i^{(5)} = \beta_{i-2}^{(5)} - {}^4/_3 a^2 \frac{i-1}{f} \cdot \beta_{i-1}^{(3)}$$

ε	$\log \beta_0^{(5)}$	$\log \beta_1^{(5)}$	$\log \beta_2^{(5)}$	$\log \beta_3^{(5)}$	$\log \beta_4^{(5)}$	$\log \beta_5^{(5)}$	$\log \beta_6^{(5)}$	$\log \beta_7^{(5)}$
0^0	1.437136	1.344390	1.171084	0.953495	0.707998	0.443329	0.164680	9.875400
15	1.483599	1.400185	1.240801	1.038882	0.809895	0.562200	0.300812	0.028973
30	1.533202	1.458801	1.313259	1.127079	0.914757	0.684246	0.440362	0.186234
45	1.583499	1.517279	1.384686	1.213391	1.016918	0.802801	0.575646	0.338472
60	1.634297	1.575373	1.454681	1.297223	1.115566	0.916825	0.705396	0.484181
75	1.687051	1.634668	1.524975	1.380451	1.212726	1.028496	0.831943	0.625846
90	1.743663	1.697196	1.597749	1.465417	1.310910	1.140497	0.958142	0.766498
105	1.805056	1.763901	1.673935	1.553025	1.410980	1.253647	1.084765	0.906864
120	1.869818	1.833283	1.751807	1.641249	1.510574	1.365225	1.208723	1.043472
135	1.933171	1.900390	1.825999	1.724180	1.603168	1.468043	1.322132	1.167722
150	1.986494	1.956376	1.887125	1.791709	1.677815	1.550250	1.412189	1.265828
165	2.018223	1.989424	1.922754	1.830575	1.720294	1.596576	1.462515	1.320261

ε	$\log \beta_0^{(5)}$	$\log \beta_1^{(5)}$	$\log \beta_2^{(5)}$	$\log \beta_3^{(5)}$	$\log \beta_4^{(5)}$	$\log \beta_5^{(5)}$	$\log \beta_6^{(5)}$	$\log \beta_7^{(5)}$
180°	2.017081	1.987973	1.920695	1.827754	1.716621	1.591995	1.456989	1.313764
195	1.977023	1.945661	1.873994	1.775564	1.658318	1.527181	1.385414	1.235251
210	1.901034	1.865130	1.784830	1.675717	1.546635	1.402968	1.248208	1.084737
225	1.800344	1.757298	1.663926	1.538895	1.392344	1.230276	1.056512	0.873628
240	1.689966	1.637044	1.526431	1.380820	1.211920	1.026465	0.828654	0.621277
255	1.584078	1.518832	1.387807	1.218327	1.023791	0.811681	0.586578	0.351486
270	1.493547	1.414543	1.261883	1.067589	0.846665	0.607277	0.354347	0.091064
285	1.425331	1.333062	1.160458	0.943655	0.698985	0.435153	0.157379	9.868925
300	1.382783	1.280260	1.092754	0.859331	0.597226	0.315521	0.019580	9.712832
315	1.366078	1.258480	1.063743	0.822310	0.551829	0.261549	9.956913	9.641391
330	1.372747	1.265950	1.072349	0.832171	0.563005	0.274063	9.970798	9.656630
345	1.398307	1.297133	1.111563	0.880292	0.620440	0.341044	0.047446	9.743063

ε	$\log \beta_8^{(5)}$	$\log \beta_9^{(5)}$	$\log \beta_{10}^{(5)}$	$\log \beta_{11}^{(5)}$	$\log \beta_{12}^{(5)}$	$\log \beta_{13}^{(5)}$	$\log \beta_{14}^{(5)}$	$\log \beta_{15}^{(5)}$	$\log \beta_{16}^{(5)}$
0°	9.577741	9.273360	8.96336	8.64882	8.33010	8.00847	7.68288	7.35695	7.02428
15	9.748896	9.462159	9.16993	8.87309	8.57234	8.26817	7.96112	7.65133	7.33951
30	9.924016	9.655238	9.38105	9.10230	8.81970	8.53367	8.24487	7.95317	7.65971
45	0.093360	9.841806	9.58492	9.32354	9.05833	8.78981	8.51839	8.24440	7.96809
60	0.255190	0.019874	9.77931	9.53433	9.28557	9.03355	8.77866	8.52127	8.26158
75	0.412142	0.192238	9.96718	9.73778	9.50465	9.26831	9.02915	8.78751	8.54364
90	0.567429	0.362291	0.15210	9.93764	9.71952	9.49823	9.27418	9.04769	8.81904
105	0.721725	0.530656	0.33464	0.13443	9.93062	9.72370	9.51404	9.30199	9.08776
120	0.871174	0.693087	0.51016	0.32312	0.13255	9.93892	9.74260	9.54392	9.34310
135	1.006446	0.839511	0.66783	0.49213	0.31295	0.13076	9.94592	9.75873	9.56946
150	1.112745	0.954110	0.79081	0.62355	0.45287	0.27922	0.10295	9.92437	9.74373
165	1.171362	1.016968	0.85796	0.69501	0.52867	0.35938	0.18750	0.01331	9.83708
180	1.163874	1.008477	0.84845	0.68448	0.51710	0.34677	0.17382	9.99858	9.82124
195	1.078297	0.915740	0.74848	0.57723	0.40253	0.22484	0.04452	9.86188	9.67716
210	0.914249	0.737991	0.55691	0.37173	0.18302	9.99127	9.79682	9.60001	9.40108
225	0.683437	0.487262	0.28610	0.08071	9.87171	9.65956	9.44467	9.22735	9.00786
240	0.406280	0.185071	9.95870	9.72798	9.49353	9.25587	9.01538	8.77243	8.52725
255	0.108475	9.859038	9.60428	9.34504	9.08197	8.81563	8.54636	8.27465	8.00049
270	9.819614	9.541554	9.25804	8.96995	8.67799	8.38267	8.08453	7.78383	7.48130
285	9.572191	9.268512	8.95959	8.64518	8.32813	8.00410	7.68285	7.34291	7.02674
300	9.397595	9.075522	8.74779	8.41534	8.11355	7.73859	7.54183	7.04771	7.17480
315	9.317335	8.986399	8.64981	8.30846	7.96310	7.61411	7.26216	6.90661	6.54896
330	9.333999	9.004365	8.66937	8.32901	7.98601	7.63646	7.29064	6.92663	6.59433
345	9.430216	9.110542	8.78526	8.45526	8.12128	7.78380	7.44343	7.10009	6.75491

Als Kontrolle der $\beta_i^{(5)}$ hade ich die $\beta_i^{(3)}$ aus folgender Gleichung berechnet:

$$\beta_i^{(3)} = \frac{3f}{4a^2 i}\,[\beta_{i-1}^{(5)} - \beta_{i+1}^{(5)}]$$

Diese Formel giebt nur eine Kontrolle unter der Bedingung, dass $\beta_0^{(5)}$ und $\beta_1^{(5)}$ auf andere Weise Kontrollirt ist.

Die $\beta_i^{(5)}$ sind nämlich aus folgender Formel berechnet:

$$\beta_{i+1}^{(5)} = \beta_{i-1}^{(5)} - B_i \beta_i^{(3)}$$

und wenn wir annehmen, dass $B_i\beta_i^{(3)}$ fehlerfrei ist, so bewirkt ein Fehler in $\beta_{i-1}^{(5)}$ einen gleich grossen in $\beta_{i+1}^{(5)}$, die Differenz $\beta_{i-1}^{(5)} - \beta_{i+1}^{(5)}$ ist also fehlerfrei und obwohl beliebig grosse, gleiche Fehler in sowohl $\beta_{i-1}^{(5)}$ wie in $\beta_{i+1}^{(5)}$ vorkommen, stimmt doch die Kontrolle $\beta_i^{(3)}$ mit der vorher berechneten. Um die $\beta_0^{(5)}$ und $\beta_1^{(5)}$ zu kontrolliren ist folgende Gleichung angewandt:

$$D\beta_0^{(5)} - f\beta_1^{(5)} = a^2\beta_0^{(3)}$$

Die Übereinstimmung dieser Kontrollen mit der vorigen Rechnung war vollständig.

Die $\beta_i^{(7)}$ wurden aus Formeln denen analog, vermittelst welchen $\beta_i^{(5)}$ evaluirt sind, berechnet.

$$\beta_0^{(7)} + \beta_1^{(7)} = \frac{\beta_0^{(5)} + {}^3/_5\beta_1^{(5)}}{D-f} \qquad \beta_0^{(7)} - \beta_1^{(7)} = \frac{\beta_0^{(5)} - {}^3/_5\beta_1^{(5)}}{D+f}$$

$$\beta_i^{(7)} = \beta_{i-2}^{(7)} - \frac{4(i-1)}{5f} \cdot \beta_{i-1}^{(5)}$$

ε	$\log \beta_0^{(7)}$	$\log \beta_1^{(7)}$	$\log \beta_2^{(7)}$	$\log \beta_3^{(7)}$	$\log \beta_4^{(7)}$	$\log \beta_5^{(7)}$	$\log \beta_6^{(7)}$	$\log \beta_7^{(7)}$
0°	1.25127	1.20309	1.08804	0.92758	0.73501	0.51867	0.28421	0.03532
15	1.32683	1.28402	1.17966	1.03258	0.85486	0.65429	0.43612	0.20401
30	1.40749	1.36975	1.27581	1.14200	0.97909	0.79438	0.59258	0.37745
45	1.48921	1.45595	1.37160	1.25012	1.10120	0.93140	0.74531	0.54612
60	1.57151	1.54217	1.46645	1.35628	1.22025	1.06436	0.89283	0.70869
75	1.65650	1.63061	1.56271	1.46293	1.33888	1.19596	1.03808	0.86805
90	1.74697	1.72415	1.66340	1.57328	1.46045	1.32979	1.18485	1.02829
105	1.84417	1.82406	1.76980	1.68858	1.58618	1.46700	1.33421	1.19036
120	1.94574	1.92796	1.87941	1.80611	1.71311	1.60429	1.48260	1.35028
135	2.04427	2.02836	1.98449	1.91778	1.83265	1.73258	1.62027	1.49778
150	2.12657	2.11198	2.07146	2.00952	1.93011	1.83647	1.73104	1.61583
165	2.17502	2.16107	2.12223	2.06267	1.98617	1.89576	1.79385	1.68231
180	2.17246	2.15836	2.11913	2.05900	1.98183	1.89064	1.78793	1.67549
195	2.10967	2.09446	2.05238	1.98820	1.90611	1.80944	1.70079	1.58214
210	1.99102	1.97356	1.92578	1.85359	1.76187	1.65452	1.53434	1.40367
225	1.83343	1.81236	1.75578	1.67137	1.56521	1.44190	1.30471	1.15629
240	1.65963	1.63346	1.56492	1.46427	1.33923	1.19523	1.03623	0.86503
255	1.49145	1.45872	1.37552	1.25553	1.10831	0.94034	0.75616	0.55896
270	1.34610	1.30578	1.20652	1.06587	0.89536	0.70243	0.49224	0.26823
285	1.23525	1.18735	1.07284	0.91306	0.72122	0.50568	0.27203	0.02396
300	1.16514	1.11120	0.98505	0.81091	0.60325	0.37101	0.12010	9.85443
315	1.13690	1.07991	0.94805	0.76692	0.55164	0.31134	0.05225	9.77808
330	1.14698	1.09048	0.95951	0.77948	0.56539	0.32636	0.06854	9.79568
345	1.18820	1.13507	1.01044	0.83818	0.63256	0.40253	0.15381	9.89055

ε	$\log \beta_8^{(7)}$	$\log \beta_9^{(7)}$	$\log \beta_{10}^{(7)}$	$\log \beta_{11}^{(7)}$	$\log \beta_{12}^{(7)}$	$\log \beta_{13}^{(7)}$	$\log \beta_{14}^{(7)}$
0°	9.77497	9.50478	9.22690	8.94127	8.6506	8.3516	8.0496
15	9.96057	9.77780	9.44711	9.17974	8.9064	8.6279	8.3441
30	0.15101	9.91594	9.67230	9.42357	9.1664	8.9089	8.6380
45	0.33632	0.11756	9.89147	9.65874	9.4210	9.1777	8.9317
60	0.51424	0.31113	0.10081	9.88415	9.6623	9.4356	9.2054
75	0.68802	0.49958	0.30401	0.10225	9.8951	9.6831	9.4668
90	0.86206	0.68777	0.50650	0.31938	0.1269	9.9301	9.7289
105	1.03715	0.87625	0.70847	0.53521	0.3565	0.1740	9.9867
120	1.20906	1.06030	0.90506	0.74423	0.5785	0.4085	0.2345
135	1.36673	1.22838	1.08378	0.93369	0.7789	0.6197	0.4569
150	1.49228	1.36171	1.22495	1.08297	0.9362	0.7854	0.6307
165	1.56263	1.43597	1.30331	1.16539	1.0229	0.8763	0.7261
180	1.55495	1.42731	1.29377	1.15479	1.0115	0.8637	0.7128
195	1.45509	1.32084	1.18044	1.03463	0.8842	0.7295	0.5712
210	1.26406	1.11706	0.96345	0.80447	0.6403	0.4722	0.2996
225	0.99834	0.83265	0.65993	0.48179	0.2980	0.1107	9.9180
240	0.68386	0.49423	0.29761	0.09471	9.8869	9.6739	9.4579
255	0.75117	0.13452	9.91049	9.68005	9.4444	9.2038	8.9599
270	0.03316	9.78862	9.53660	9.27718	9.0130	8.7410	8.4678
285	9.76452	9.49505	9.21871	8.93295	8.6477	8.3437	8.0698
300	9.57701	9.28959	8.99434	8.69115	8.3832	7.9305	7.7500
315	9.49250	9.19629	8.89394	8.58135	8.2715	7.9425	7.6468
330	9.51138	9.21632	8.91536	8.60266	8.2955	7.9581	7.6759
345	9.61532	9.33074	9.03734	8.73835	8.4307	8.1231	7.7996

Die Kontrolle ergab sich aus folgenden Gleichungen:

$$\beta_i^{(5)} = [\beta_{i-1}^{(7)} - \beta_{i+1}^{(7)}]\frac{5f}{4i}$$

$$D\beta_0^{(7)} - f\beta_1^{(7)} = \beta_0^{(5)}$$

4.

Durch Berechnung der β sind die Koeffizienten der folgenden Reihen bestimmt:

$$\frac{1}{12}\frac{m'}{\sin 1''}[D - f\cos(\varepsilon' - F)]^{-1/2} = \beta_0^{(1)} + 2\beta_1^{(1)}\cos(\varepsilon' - F) + 2\beta_2^{(1)}\cos 2(\varepsilon' - F) + \ldots.$$

$$\frac{1}{12}\frac{a^2 m'}{\sin 1''}[D - f\cos(\varepsilon' - F)]^{-3/2} = \beta_0^{(3)} + 2\beta_1^{(3)}\cos(\varepsilon' - F) + 2\beta_2^{(3)}\cos 2(\varepsilon' - F) + \ldots.$$

$$\frac{1}{12}\frac{a^4 m'}{\sin 1''}[D - f\cos(\varepsilon' - F)]^{-5/2} = \beta_0^{(5)} + 2\beta_1^{(5)}\cos(\varepsilon' - F) + 2\beta_2^{(5)}\cos 2(\varepsilon' - F) + \ldots.$$

$$\frac{1}{12}\frac{a^4 m'}{\sin 1''}[D - f\cos(\varepsilon' - F)]^{-7/2} = \beta_0^{(7)} + 2\beta_1^{(7)}\cos(\varepsilon' - F) + 2\beta_2^{(7)}\cos 2(\varepsilon' - F) + \ldots.$$

Die Reihen sollen jetzt so umgeändert werden, dass sie nach Multipeln von $\varepsilon - \varepsilon'$ fortlaufen. Wenn man eine beliebige dieser Reihen mit $\frac{1}{12}A^{-n/2}$ bezeichnet, ist

$$A^{-n/2} = Y_{o.c}^{(n)} + 2\sum_{i=1} Y_{i.c}^{(n)}\cos i(\varepsilon - \varepsilon') - 2\sum_{i=1} Y_{i.s}^{(n)}\sin i(\varepsilon - \varepsilon')$$

wo

$$Y_{i.c}^{(n)} = 12\beta_i^{(n)}\cos i(F - \varepsilon) = \frac{1}{2}C_{o.i}^{n.c} + \sum_{\nu=1} C_{\nu.i}^{n.c}\cos\nu\varepsilon + \sum_{\nu=1} S_{\nu.i}^{n.c}\sin\nu\varepsilon$$

$$Y_{i.s}^{(n)} = 12\beta_i^{(n)}\sin i(F - \varepsilon) = \frac{1}{2}C_{o.i}^{n.s} + \sum_{\nu=1} C_{\nu.i}^{n.s}\cos\nu\varepsilon + \sum_{\nu=1} S_{\nu.i}^{n.s}\sin\nu\varepsilon$$

Diese c und s Koeffizienten werden folgendermassen bestimmt; schreibt man eine beliebige dieser Reihen für ein beliebiges n und i für c oder s einfach

$$Y = \frac{1}{2}c_0 + c_1\cos\varepsilon + c_2\cos 2\varepsilon + c_3\cos 3\varepsilon + \ldots.$$

$$+ s_1\sin\varepsilon + s_2\sin 2\varepsilon + s_3\sin 3\varepsilon + \ldots.$$

und berechnet man dieses Y für die 24 verschieden Werte von $\varepsilon = 0°, 15°, 30°$ etc., bekommt man daraus 24 Reihen mit den linken Seiten numerisch bestimmt

und kann aus diesen Gleichungen 24 der Koeff. c und s bestimmen. Bezeichnet man Y für $\varepsilon = 0^0$ mit Y_0, für $\varepsilon = 15^0$ mit Y_1 etc. und endlich Y für $\varepsilon = 345^0$ mit Y_{23}, so bekommt man folgendes für jedes $Y_{i \cdot s}^{(n)}$ geltendes Formelsystem:

$$\frac{1}{2}(c_0 + 2c_{12}) = (0.6) + (2.8) + (4.10) \qquad \frac{1}{2}(c_1 + c_{11}) = b_0 + b_4 + b_6$$

$$\frac{1}{2}(c_0 - 2c_{12}) = (1.7) + (3.9) + (5.11) \qquad \frac{1}{2}(c_1 - c_{11}) = b_1 + b_5 + b_9$$

$$\frac{1}{2}(c_2 + c_{10}) = (0/6) + \frac{1}{2}[(2/8) - (4/10)]. \qquad \frac{1}{2}(c_3 + c_9) = b_0 - 2b_6$$

$$\frac{1}{2}(c_2 - c_{10}) = [(1/7) - (5/11)] \cos 30 \qquad \frac{1}{2}(c_3 - c_9) = b_2 - b_5 - b_8$$

$$\frac{1}{2}(c_4 + c_8) = (0.6) - \frac{1}{2}[(2.8) + (4.10)] \qquad \frac{1}{2}(c_5 + c_7) = b_0 - b_4 + b_6$$

$$\frac{1}{2}(c_4 - c_8) = \frac{1}{2}[(1.7) + (5.11)] - (3.9) \qquad \frac{1}{2}(c_5 - c_7) = b_3 - b_5 + b_7$$

$$c_6 = (0/6) - (2/8) + (4/10) \qquad \frac{1}{2}(s_1 + s_{11}) = a_3 + a_5 + a_7$$

$$\frac{1}{2}(s_2 + s_{10}) = \frac{1}{2}[(1/7) + (5/11)] + (3/9) \qquad \frac{1}{2}(s_1 - s_{11}) = a_0 + a_4 + a_6$$

$$\frac{1}{2}(s_2 - s_{10}) = [(2/8) + (4/10)] \cos 30 \qquad \frac{1}{2}(s_3 + s_9) = a_2 + a_5 - a_8$$

$$\frac{1}{2}(s_4 + s_8) = [(1.7) - (5.11)] \cos 30 \qquad \frac{1}{2}(s_3 - s_9) = 2a_4 - a_0$$

$$\frac{1}{2}(s_4 - s_8) = [(2.8) - (4.10)] \cos 30 \qquad \frac{1}{2}(s_5 + s_7) = a_1 - a_5 + a_9$$

$$s_6 = (1/7) - (3/9) + (5/11) \qquad \frac{1}{2}(s_5 - s_7) = a_0 + a_4 - a_6$$

wo

$a_0 = (6/18)$ $\quad a_5 = (3.9) \cos 45$ $\quad b_0 = (0/12)$ $\quad b_5 = (3/9) \cos 45$

$a_1 = (1.11) \cos 15$ $\quad a_6 = (4.8) \cos 30$ $\quad b_1 = (1/11) \cos 15$ $\quad b_6 = \frac{1}{2}(4/8)$

$a_2 = (1.11) \cos 45$ $\quad a_7 = (5.7) \cos 15$ $\quad b_2 = (1/11) \cos 45$ $\quad b_7 = (5/7) \cos 15$

$a_3 = (1.11) \cos 75$ $\quad a_8 = (5.7) \cos 45$ $\quad b_3 = (1/11) \cos 75$ $\quad b_8 = (5/7) \cos 45$

$a_4 = \frac{1}{2}(2.10)$ $\quad a_9 = (5.7) \cos 75$ $\quad b_4 = (2/10) \cos 30$ $\quad b_9 = (5/7) \cos 75$

und überdies folgende Bezeichungen eingeführt sind:

$$\frac{1}{12}(Y_k + Y_{k+12}) = (k\,.\,k+12); \qquad \frac{1}{12}(Y_k - Y_{k+12}) = (k/k+12)$$

$$(k.k+12) + (k+6.k+18) = (k.k+6); \quad (k/k+12) + (12-k/24-k) = (k.12-k)$$

$$(k.k+12) - (k+6.k+18) = (k/k+6); \quad (k/k+12) - (12-k/24-k) = (k/12-k)$$

Folgendes Rechenschema macht die Rechnung übersichtlich und bequem:

	$k=0$	1	2	3	4	5
Y_k	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5
Y_{k+12}	Y_{12}	Y_{13}	Y_{14}	Y_{15}	Y_{16}	Y_{17}
$(k\,.\,k+12)$	(0.12)	(1.13)	(2.14)	(3.15)	(4.16)	(5.17)
$(k\,/\,k+12)$	(0 12)	(1/13)	(2/14)	(3/15)	(4/16)	(5/17)
Y_{k+6}	Y_6	Y_7	Y_8	Y_9	Y_{10}	Y_{11}
Y_{k+18}	Y_{18}	Y_{19}	Y_{20}	Y_{21}	Y_{22}	Y_{23}
$(k+6\,.\,k+18)$	(6.18)	(7.19)	(8.20)	(9.21)	(10.22)	(11.23)
$(k+6/k+18)$	(6/18)	(7/19)	(8/20)	(9/21)	(10/22)	(11/23)
$(k\,.\,k+6)$	(0.6)	(1.7)	(2.8)	(3.9)	(4.10)	(5.11)
$(k/k+6)$	(0/6)	(1/7)	(2/8)	(3/9)	(4/10)	(5/11)
$(k\,.\,12-k)$	(0.12)	(1.11)	(2.10)	(3.9)	(4.8)	(5.7)
$(k\,/\,12-k)$	(0/12)	(1/11)	(2/10)	(3/9)	(4/8)	(5/7)
a_k	a_0	a_1	a_2	a_3	a_4	a_5
a_{6+k}	a_6	a_7	a_8	a_9		
b_k	b_0	b_1	b_2	b_3	b_4	b_5
b_{6+k}	b_6	b_7	b_8	b_9		

Nachdem diese Quantitäten berechnet sind, sind die c und s leicht zu evaluiren, was alles sehr rasch mit Rechenmaschine vor sich geht.

Die c und s Koeffizienten bekommen folgende Werte:

	$Y^{(1)}_{i.c}$							
	$i=0$	$i=1$	$i=2$	$i=3$	$i=4$	$i=5$	$i=6$	$i=7$
c_0	+220.54841	+12.01919	−20.54523	−5.56362	+2.90306	+1.67231	−0.31331	−0.42626
c_1	− 3.36676	+ 1.26506	+ 5.11604	+0.58638	−1.72483	−0.57867	+0.41771	+0.26715
c_2	+ 0.98983	+ 0.35164	− 1.14385	−0.15894	+0.70300	+0.19707	−0.28580	−0.14307
c_3	− 0.12726	− 0.02958	+ 0.21069	+0.07571	−0.19415	−0.07028	+0.11324	+0.05694
c_4	+ 0.02061	+ 0.00720	− 0.02823	−0.01959	+0.04409	+0.02289	−0.03601	−0.02099
c_5	− 0.00399	− 0.00143	+ 0.00504	+0.00509	−0.00814	−0.00696	+0.00903	+0.00700
c_6	+ 0.00065	+ 0.00028	− 0.00083	−0.00100	+0.00140	+0.00183	−0.00193	−0.00214
c_7	− 0.00013	− 0.00006	+ 0.00015	+0.00021	−0.00023	−0.00043	+0.00036	+0.00059
c_8	+ 0.00002	+ 0.00001	− 0.00003	−0.00004	+0.00004	+0.00009	−0.00006	−0.00015
c_9	0.00002	− 0.00001	+ 0.00001	+0.00001	−0.00001	−0.00002	+0.00001	+0.00004
c_{10}	+ 0.00001	0.00000	− 0.00001	0.00000	+0.00001	0.00000	0.00000	−0.00002
c_{11}	− 0.00002	0.00000	+ 0.00001	+0.00001	−0.00001	0.00000	0.00000	0.00000
c_{12}	+ 0.00001	0.00000	− 0.00001	0.00000	0.00000	0.00000	0.00000	0.00000
s_1	+ 1.35358	+ 5.78742	− 0.32786	−2.85442	−0.61462	+0.80650	+0.38284	−0.15780
s_2	+ 0.42407	− 0.58381	− 0.21287	+0.75372	+0.15870	−0.41389	−0.15837	+0.14776
s_3	+ 0.01741	+ 0.07191	+ 0.06359	−0.19755	−0.06859	+0.14905	+0.06264	−0.07491
s_4	+ 0.01138	− 0.00878	− 0.01764	+0.03365	+0.02201	−0.04032	−0.02216	+0.02735
s_5	− 0.00191	+ 0.00164	+ 0.00340	−0.00548	−0.00627	+0.00876	+0.00707	−0.00795
s_6	+ 0.00045	− 0.00026	− 0.00071	+0.00086	+0.00147	−0.00166	−0.00204	+0.00192
s_7	− 0.00009	+ 0.00005	+ 0.00015	−0.00014	−0.00032	+0.00028	+0.00052	−0.00039
s_8	+ 0.00003	0.00000	− 0.00004	+0.00002	+0.00007	−0.00005	−0.00012	+0.00007
s_9	− 0.00002	0.00000	+ 0.00001	0.00000	−0.00002	+0.00001	+0.00003	−0.00001
s_{10}	0.00000	0.00000	− 0.00001	0.00000	0.00000	+0.00001	−0.00001	+0.00001
s_{11}	0.00000	0.00000	0.00000	0.00000	0.00000	−0.00001	0.00000	0.00000

	$i=8$	$i=9$	$i=10$	$i=11$	$i=12$	$i=13$	$i=14$	$i=15$	$i=16$
c_0	−0.00654	+0.09663	+0.01837	−0.01965	−0.00762	+0.00352	+0.00241	−0.00051	−0.00067
c_1	−0.06751	−0.09254	+0.00024	+0.02653	+0.00531	−0.00641	−0.00276	+0.00126	+0.00100
c_2	+0.08146	+0.07131	−0.01352	−0.02771	−0.00149	+0.00882	+0.00238	−0.00230	−0.00124
c_3	−0.04749	−0.03619	+0.01373	+0.01820	−0.00166	−0.00747	−0.00100	+0.00254	+0.00091
c_4	+0.01998	+0.01553	−0.00794	−0.00935	+0.00192	+0.00465	+0.00013	−0.00194	−0.00047
c_5	−0.00655	−0.00584	+0.00335	+0.00405	−0.00114	−0.00235	+0.00011	+0.00115	+0.00019
c_6	+0.00176	+0.00199	−0.00112	−0.00155	+0.00049	+0.00103	−0.00010	−0.00058	−0.00006
c_7	−0.00040	−0.00062	+0.00031	+0.00054	−0.00016	−0.00040	+0.00004	+0.00024	+0.00002
c_8	+0.00008	+0.00018	−0.00007	−0.00017	+0.00005	+0.00014	−0.00001	−0.00010	−0.00001
c_9	−0.00001	−0.00005	+0.00001	+0.00005	−0.00001	−0.00005	0.00000	+0.00004	+0.00001
c_{10}	0.00000	+0.00001	0.00000	−0.00002	0.00000	+0.00002	0.00000	−0.00001	0.00000
c_{11}	0.00000	−0.00001	0.00000	0.00000	0.00000	−0.00001	0.00000	+0.00001	0.00000
c_{12}	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
s_1	−0.14857	+0.01321	+0.04533	+0.00590	−0.01146	−0.00400	+0.00236	+0.00157	−0.00034
s_2	+0.09653	−0.03489	−0.04291	+0.00273	+0.01524	+0.00243	−0.00444	−0.00173	+0.00103
s_3	−0.04591	+0.02668	+0.02603	−0.00581	−0.01183	−0.00030	+0.00442	+0.00107	−0.00136
s_4	+0.01831	−0.01301	−0.01224	+0.00424	+0.00671	−0.00056	−0.00306	−0.00041	+0.00116
s_5	−0.00650	+0.00486	+0.00496	−0.00208	−0.00315	+0.00050	+0.00168	+0.00010	−0.00076
s_6	+0.00210	−0.00146	−0.00179	+0.00078	+0.00128	−0.00026	−0.00078	0.00000	+0.00041
s_7	−0.00062	+0.00036	+0.00059	−0.00023	−0.00047	+0.00010	+0.00032	−0.00001	−0.00019
s_8	+0.00017	−0.00008	−0.00018	+0.00006	+0.00016	−0.00003	−0.00012	0.00000	+0.00008
s_9	−0.00004	+0.00001	+0.00005	−0.00001	−0.00005	0.00000	+0.00004	0.00000	−0.00003
s_{10}	+0.00001	0.00000	−0.00001	0.00000	+0.00002	0.00000	−0.00001	0.00000	+0.00001
s_{11}	0.00000	0.00000	0.00000	0.00000	−0.00001	0.00000	0.00000	0.00000	−0.00001

$Y^{(1)}_{i,s}$

	$i=1$	$i=2$	$i=3$	$i=4$	$i=5$	$i=6$	$i=7$	$i=8$
c_0	−56.90365	−9.05545	+7.78622	+3.13298	−1.01851	−0.85812	+0.06745	+0.20572
c_1	+ 7.05168	−0.02665	−3.11919	−0.69336	+0.88230	+0.41254	−0.18014	−0.16155
c_2	− 1.18558	−0.17717	+0.95296	+0.18759	−0.46869	−0.17822	+0.15990	+0.10478
c_3	+ 0.14441	+0.06950	−0.21905	−0.07361	+0.15488	+0.06500	−0.07636	−0.04684
c_4	− 0.02232	−0.01510	+0.03909	+0.02200	−0.04226	−0.02251	+0.02795	+0.01854
c_5	+ 0.00425	+0.00310	−0.00648	−0.00633	+0.00911	+0.00715	−0.00805	−0.00654
c_6	− 0.00069	−0.00060	+0.00105	+0.00146	−0.00173	−0.00205	+0.00194	+0.00211
c_7	+ 0.00014	+0.00013	−0.00019	−0.00032	+0.00029	+0.00052	−0.00040	−0.00062
c_8	− 0.00004	−0.00002	+0.00003	+0.00007	−0.00005	−0.00012	+0.00007	+0.00017
c_9	+ 0.00002	−0.00001	−0.00001	−0.00002	+0.00001	+0.00003	−0.00002	−0.00004
c_{10}	0.00000	0.00000	+0.00001	+0.00001	0.00000	−0.00001	+0.00001	+0.00001
c_{11}	+ 0.00001	+0.00001	0.00000	0.00000	0.00000	0.00000	−0.00001	0.00000
c_{12}	− 0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	+0.00001	0.00000
s_1	− 1.90352	−4.56858	−0.43872	+1.58607	+0.53216	−0.37608	−0.24752	+0.05603
s_2	− 0.51623	+0.78975	+0.14326	−0.59598	−0.17050	+0.25917	+0.12981	−0.07635
s_3	+ 0.02923	−0.17067	−0.06942	+0.18285	+0.06673	−0.11029	−0.05545	+0.04678
s	− 0.01299	+0.01953	+0.02042	−0.04079	−0.02266	+0.03492	+0.02069	−0.01967
s_5	+ 0.00227	−0.00339	−0.00513	+0.00755	+0.00687	−0.00884	−0.00695	+0.00650
s_6	− 0.00052	+0.00054	+0.00105	−0.00128	−0.00182	+0.00188	+0.00214	−0.00175
s_7	+ 0.00012	−0.00009	−0.00022	+0.00020	+0.00043	−0.00035	−0.00060	+0.00040
s_8	− 0.00003	+0.00001	+0.00005	−0.00003	−0.00010	+0.00006	+0.00016	−0.00008
s_9	+ 0.00001	0.00000	−0.00001	0.00000	+0.00002	−0.00001	−0.00004	+0.00001
s_{10}	− 0.00001	0.00000	+0.00001	0.00000	−0.00001	0.00000	+0.00001	0.00000
s_{11}	+ 0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	−0.00001	0.00000

	$i=9$	$i=10$	$i=11$	$i=12$	$i=13$	$i=14$	$i=15$	$i=16$
c_0	+ 0.02116	−0.04419	−0.01250	+0.00848	+0.00437	−0.00139	−0.00129	+0.00016
c_1	+ 0.01871	+0.05061	+0.00506	−0.01333	−0.00409	+0.00293	+0.00171	−0.00049
c_2	− 0.03676	−0.04566	+0.00273	+0.01601	+0.00257	−0.00463	−0.00181	+0.00107
c_3	+ 0.02700	+0.02637	−0.00586	−0.01195	−0.00029	+0.00446	+0.00108	−0.00137
c_4	− 0.01316	−0.01235	+0.00427	+0.00675	−0.00056	−0.00307	−0.00042	+0.00117
c_5	+ 0.00489	+0.00498	−0.00208	−0.00315	+0.00050	+0.00168	+0.00010	−0.00076
c_6	− 0.00147	−0.00179	+0.00079	+0.00128	−0.00026	−0.00078	0.00000	+0.00041
c_7	+ 0.00037	+0.00059	−0.00023	−0.00047	+0.00009	+0.00032	−0.00001	−0.00019
c_8	− 0.00008	−0.00018	+0.00006	+0.00016	−0.00003	−0.00012	0.00000	+0.00008
c_9	+ 0.00001	+0.00005	−0.00001	−0.00005	+0.00001	+0.00004	0.00000	−0.00003
c_{10}	0.00000	−0.00002	0.00000	+0.00001	0.00000	−0.00001	0.00000	+0.00001
c_{11}	0.00000	+0.00001	0.00000	0.00000	0.00000	+0.00001	0.00000	0.00000

	$i=9$	$i=10$	$i=11$	$i=12$	$i=13$	$i=14$	$i=15$	$i=16$
s_1	+0.08414	+0.00213	−0.02332	−0.00548	+0.00535	+0.00260	−0.00095	−0.00090
s_2	−0.06645	+0.01302	+0.02622	+0.00135	−0.00843	−0.00227	+0.00221	+0.00119
s_3	+0.03563	−0.01358	−0.01800	+0.00165	+0.00740	+0.00099	−0.00251	−0.00090
s_4	−0.01537	+0.00786	+0.00928	−0.00191	−0.00463	−0.00013	+0.00193	+0.00047
s_5	+0.00581	−0.00334	−0.00404	+0.00114	+0.00235	−0.00012	−0.00115	−0.00019
s_6	−0.00198	+0.00112	+0.00155	−0.00049	−0.00102	+0.00010	+0.00058	+0.00006
s_7	+0.00061	−0.00031	−0.00054	+0.00017	+0.00040	−0.00004	−0.00025	−0.00002
s_8	−0.00018	+0.00007	+0.00017	−0.00004	−0.00014	+0.00001	+0.00010	+0.00001
s_9	+0.00004	−0.00001	−0.00005	+0.00001	+0.00005	0.00000	−0.00004	0.00000
s_{10}	−0.00002	0.00000	+0.00002	0.00000	−0.00002	0.00000	+0.00001	−0.00001
s_{11}	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

$Y^{(3)}_{i,c}$

	$i=0$	$i=1$	$i=2$	$i=3$	$i=4$	$i=5$	$i=6$	$i=7$
c_0	+415.11518	+59.50586	−165.42039	−61.28914	+41.94018	+29.06801	−6.86043	−10.32311
c_1	− 59.10745	+ 0.19556	+ 55.22620	+11.53091	−27.18244	−11.97050	+8.83019	+ 6.88055
c_2	+ 15.73912	+ 1.41965	− 16.16338	− 2.56897	+12.49022	+ 4.20157	−6.46283	− 3.74499
c_3	− 3.62965	− 0.41945	+ 4.16214	+ 1.16245	− 4.05041	− 1.54444	+2.82500	+ 1.56921
c_4	+ 0.77218	+ 0.11037	− 0.91592	− 0.34164	+ 1.13982	+ 0.53309	−1.01346	− 0.60842
c_5	− 0.18161	− 0.03427	+ 0.21116	+ 0.11124	− 0.27754	− 0.17883	+0.29910	+ 0.21753
c_6	+ 0.03911	+ 0.00861	− 0.04611	− 0.02962	+ 0.06380	+ 0.05445	−0.07790	− 0.07244
c_7	− 0.00874	− 0.00230	+ 0.01014	+ 0.00786	− 0.01396	− 0.01528	+0.01833	+ 0.02228
c_8	+ 0.00192	+ 0.00056	− 0.00223	− 0.00198	+ 0.00302	+ 0.00405	−0.00398	− 0.00637
c_9	− 0.00065	− 0.00019	+ 0.00062	+ 0.00056	− 0.00069	− 0.00107	+0.00081	+ 0.00171
c_{10}	+ 0.00026	+ 0.00005	− 0.00024	− 0.00018	+ 0.00020	+ 0.00031	−0.00019	− 0.00043
c_{11}	− 0.00025	− 0.00003	+ 0.00018	+ 0.00010	− 0.00010	− 0.00013	+0.00010	+ 0.00011
c_{12}	+ 0.00009	0.00000	− 0.00008	− 0.00003	+ 0.00005	+ 0.00005	−0.00005	− 0.00002
s_1	+ 23.53201	+30.00741	− 7.67569	−31.80935	− 7.23792	+13.88819	+7.26556	− 3.75071
s_2	+ 0.89413	− 5.14031	− 0.52981	+10.46373	+ 2.25296	− 7.94031	−3.42271	+ 3.65210
s_3	+ 0.14044	+ 1.41257	+ 0.39081	− 3.40897	− 1.05046	+ 3.25685	+1.44903	− 2.01641
s_4	+ 0.10636	− 0.28273	− 0.20418	+ 0.83301	+ 0.40228	− 1.03970	−0.55759	+ 0.81543
s_5	− 0.03600	+ 0.06416	+ 0.06752	− 0.19044	− 0.13710	+ 0.27968	+0.19533	− 0.26990
s_6	+ 0.01158	− 0.01378	− 0.01954	+ 0.04217	+ 0.04094	− 0.06789	−0.06358	+ 0.07631
s_7	− 0.00351	+ 0.00292	+ 0.00548	− 0.00898	− 0.01125	+ 0.01515	+0.01883	− 0 01915
s_8	+ 0.00103	− 0.00057	− 0.00149	+ 0.00185	+ 0.00295	− 0.00320	−0.00519	+ 0.00435
s_9	− 0.00039	+ 0.00008	+ 0.00047	− 0.00033	− 0.00077	+ 0.00061	+0.00131	− 0.00091
s_{10}	+ 0.00011	− 0.00001	− 0.00012	+ 0.00007	+ 0.00020	− 0.00011	−0.00029	+ 0.00019
s_{11}	− 0.00001	0.00000	+ 0.00002	− 0.00002	− 0.00005	+ 0.00002	+0.00004	− 0.00004

	$i=8$	$i=9$	$i=10$	$i=11$	$i=12$	$i=13$	$i=14$	$i=15$	$i=16$
c_0	−0.03345	+3.06233	+0.59662	−0.78625	−0.31572	+0.17403	+0.12147	−0.03093	−0.04056
c_1	−1.77558	−2.92253	−0.02332	+1.00397	+0.22454	−0.28542	−0.13287	+0.06481	+0.05543
c_2	+2.26898	+2.25203	−0.44484	−1.03434	−0.06506	+0.38255	+0.11172	−0.11437	−0.06543
c_3	−1.41283	−1.19061	+0.47702	+0.69811	−0.06361	−0.32866	−0.04847	+0.12629	+0.04870
c_4	+0.64604	+0.53479	−0.29436	−0.37260	+0.08033	+0.21098	+0.00741	−0.09861	−0.02577
c_5	−0.23535	−0.21259	+0.13439	+0.16900	−0.05118	−0.11073	+0.00544	+0.06055	+0.01042
c_6	+0.07240	+0.07728	−0.04964	−0.06817	+0.02367	+0.05030	−0.00522	−0.03131	−0.00345
c_7	−0.01943	−0.02605	+0.01545	+0.02507	−0.00871	−0.02044	+0.00259	+0.01419	+0.00107
c_8	+0.00464	+0.00814	−0.00414	−0.00851	+0.00264	+0.00759	−0.00090	−0.00580	−0.00040
c_9	−0.00100	−0.00230	+0.00095	+0.00269	−0.00065	−0.00260	+0.00021	+0.00216	+0.00020
c_{10}	+0.00020	+0.00058	−0.00018	−0.00080	+0.00012	+0.00084	−0.00002	−0.00077	−0.00011
c_{11}	−0.00004	−0.00022	+0.00002	+0.00024	0.00000	−0.00027	−0.00002	+0.00026	+0.00005
c_{12}	+0.00001	+0.00010	0.00000	−0.00006	−0.00001	+0.00008	+0.00001	−0.00008	−0.00001
s_1	−3.77907	+0.44389	+1.44978	+0.18634	−0.44525	−0.16065	+0.10929	+0.07459	−0.01892
s_2	+2.66264	−1.06076	−1.43774	+0.09807	+0.60251	+0.10355	−0.20331	−0.08457	+0.05401
s_3	−1.34579	+0.85846	+0.91269	−0.21721	−0.48245	−0.01446	+0.20611	+0.05389	−0.07143
s_4	+0.57137	−0.44985	−0.45130	+0.16767	+0.28449	−0.02427	−0.14671	−0.02162	+0.06246
s_5	−0.21699	+0.18380	+0.19269	−0.08818	−0.13934	+0.02372	+0.08349	+0.00525	−0.04183
s_6	+0.07591	−0.06175	−0.07388	+0.03606	+0.05968	−0.01317	−0.04046	−0.00021	+0.02318
s_7	−0.02448	+0.01783	+0.02597	−0.01216	−0.02306	+0.00540	+0.01735	−0.00041	−0.01113
s_8	+0.00732	−0.00458	−0.00844	+0.00346	+0.00818	−0.00175	−0.00675	+0.00017	+0.00476
s_9	−0.00204	+0.00106	+0.00256	−0.00083	−0.00269	+0.00043	+0.00241	+0.00001	−0.00187
s_{10}	+0.00054	−0.00013	−0.00072	+0.00016	+0.00082	−0.00007	−0.00079	−0.00004	+0.00068
s_{11}	−0.00013	−0.00007	+0.00018	−0.00002	−0.00022	0.00000	+0.00023	+0.00003	−0.00022

$Y^{(3)}_{i,s}$

	$i=1$	$i=2$	$i=3$	$i=4$	$i=5$	$i=6$	$i=7$	$i=8$
c_0	−284.29808	−72.08753	+87.06267	+44.33087	−18.26897	−17.78995	+1.86740	+5.73207
c_1	+ 63.43059	+ 6.33235	−41.10853	−13.13062	+16.26209	+ 9.52040	−4.29063	−4.62103
c_2	− 16.08945	− 1.73932	+14.95827	+ 3.58355	− 9.42550	− 4.21668	+4.03137	+3.02026
c_3	+ 3.78866	+ 0.86246	− 4.28076	− 1.38287	+ 3.52507	+ 1.61508	−2.08479	−1.41553
c_4	− 0.81032	− 0.22731	+ 1.05676	+ 0.44689	− 1.12311	− 0.58951	+0.84205	+0.58829
c_5	+ 0.18894	+ 0.07137	− 0.24354	− 0.14774	+ 0.29918	+ 0.20285	−0.27600	−0.22090
c_6	− 0.04021	− 0.01826	+ 0.05414	+ 0.04224	− 0.07261	− 0.06482	+0.07792	+0.07669
c_7	+ 0.00876	+ 0.00483	− 0.01182	− 0.01142	+ 0.01632	+ 0.01905	−0.01954	−0.02466
c_8	− 0.00234	− 0.00119	+ 0.00258	+ 0.00294	− 0.00353	− 0.00524	+0.00446	+0.00737
c_9	+ 0.00132	+ 0.00037	− 0.00064	− 0.00080	+ 0.00076	+ 0.00140	−0.00097	−0.00208
c_{10}	− 0.00061	− 0.00012	+ 0.00022	+ 0.00025	− 0.00019	− 0.00039	+0.00022	+0.00057
c_{11}	− 0.00012	+ 0.00008	− 0.00014	− 0.00011	+ 0.00008	+ 0.00014	−0.00008	−0.00018
c_{12}	+ 0.00026	− 0.00002	+ 0.00006	+ 0.00004	− 0.00003	− 0.00005	+0.00003	+0.00005
s_1	− 19.75867	−37.32574	− 2.25256	+22.44339	+ 8.30732	− 7.67089	−5.49941	+1.54709
s_2	− 0.97031	+ 8.95796	+ 1.13210	− 9.83312	− 3.12595	+ 5.68296	+3.19740	− 2.10346
s_3	+ 0.00854	− 2.68881	− 0.74042	+ 3.55646	+ 1.30282	− 2.68577	−1.45977	+1.38158
s_4	− 0.13156	+ 0.56706	+ 0.29999	− 1.00084	− 0.49335	+ 0.96519	+0.58449	−0.63205
s_5	+ 0.04355	− 0.12813	− 0.10169	+ 0.24476	+ 0.16932	− 0.28788	−0.21190	+0.23213
s_6	− 0.01360	+ 0.02784	+ 0.02905	− 0.05617	− 0.05300	+ 0.07505	+0.07136	−0.07145
s_7	+ 0.00457	− 0.00591	− 0.00796	+ 0.01211	+ 0.01502	− 0.01764	−0.02203	+0.01918
s_8	− 0.00173	+ 0.00121	+ 0.00210	− 0.00252	− 0.00402	+ 0.00382	+0.00630	−0.00455
s_9	+ 0.00041	− 0.00020	− 0.00059	+ 0.00047	+ 0.00104	− 0.00076	−0.00169	+0.00096
s_{10}	− 0.00049	+ 0.00005	+ 0.00016	− 0.00009	− 0.00027	+ 0.00014	+0.00043	−0.00017
s_{11}	− 0.00058	− 0.00001	− 0.00004	+ 0.00003	+ 0.00007	− 0.00003	−0.00010	+0.00002

	$i=9$	$i=10$	$i=11$	$i=12$	$i=13$	$i=14$	$i=15$	$i=16$
c_0	+0.57630	−1.57892	−0.46220	+0.37793	+0.20057	−0.07617	−0.07111	+0.01100
c_1	+0.52086	+1.75443	+0.20532	−0.54823	−0.18445	+0.14069	+0.08832	−0.02708
c_2	−1.12025	−1.57133	+0.09151	+0.64524	+0.11402	−0.21521	−0.09018	+0.05678
c_3	+0.87106	+0.93892	−0.21739	−0.49186	−0.01585	+0.20899	+0.05484	−0.07226
c_4	−0.45661	−0.45879	+0.16874	+0.28720	−0.02410	−0.14768	−0.02187	+0.06273
c_5	+0.18541	+0.19440	−0.08846	−0.13983	+0.02372	+0.08372	+0.00529	−0.04189
c_6	−0.06236	−0.07426	+0.03619	+0.06018	−0.01318	−0.04053	−0.00023	+0.02320
c_7	+0.01800	+0.02607	−0.01220	−0.02293	+0.00541	+0.01737	−0.00041	−0.01115
c_8	−0.00453	−0.00848	+0.00347	+0.00802	−0.00174	−0.00675	+0.00017	+0.00479
c_9	+0.00100	+0.00258	−0.00083	−0.00304	+0.00043	+0.00242	0.00000	−0.00187
c_{10}	−0.00019	−0.00074	+0.00016	+0.00067	−0.00007	−0.00081	−0.00005	+0.00068
c_{11}	+0.00003	+0.00022	−0.00002	−0.00009	−0.00001	+0.00027	+0.00004	−0.00025
c_{12}	0.00000	−0.00006	0.00000	+0.00024	+0.00001	−0.00007	−0.00002	+0.00007
s_1	+2.41311	+0.03131	−0.82479	−0.19849	+0.22759	+0.11398	−0.04841	−0.04605
s_2	−2.02887	+0.43313	+0.95726	+0.05411	−0.35952	−0.10368	+0.10848	+0.06176
s_3	+1.14727	−0.47310	−0.68254	+0.06476	+0.32350	+0.04724	−0.12473	−0.04800
s_4	−0.52337	+0.29135	+0.36788	−0.08043	−0.20928	−0.00716	+0.09807	+0.02557
s_5	+0.21005	−0.13367	−0.16792	+0.05082	+0.11033	−0.00547	+0.06042	−0.01039
s_6	−0.07672	+0.04937	+0.06791	−0.02362	−0.05019	+0.00522	+0.03127	+0.00347
s_7	+0.02581	−0.01538	−0.02500	+0.00899	+0.02041	−0.00259	−0.01418	−0.00108
s_8	−0.00805	+0.00411	+0.00849	−0.00234	−0.00757	+0.00090	+0.00579	+0.00039
s_9	+0.00234	−0.00094	−0.00267	+0.00065	+0.00259	−0.00021	−0.00216	−0.00018
s_{10}	−0.00064	+0.00018	+0.00079	−0.00041	−0.00082	+0.00002	+0.00074	+0.00009
s_{11}	+0.00016	−0.00002	−0.00020	−0.00028	+0.00023	+0.00001	−0.00022	−0.00004

$Y^{(5)}_{i,c}$

	$i=0$	$i=1$	$i=2$	$i=3$	$i=4$	$i=5$	$i=6$	$i=7$
c_0	+1285.065	+229.355	−811.270	−358.032	+298.318	+233.770	−67.186	−107.676
c_1	− 414.973	− 34.407	+363.158	+106.794	−211.623	−114.503	+82.915	+ 76.320
c_2	+ 133.577	+ 7.346	−132.502	− 24.975	+109.462	+ 42.769	−64.848	− 42.598
c_3	− 41.587	− 3.221	+ 43.289	+ 9.987	− 41.654	− 16.172	+31.576	+ 18.831
c_4	+ 11.259	+ 0.895	− 12.391	− 3.143	+ 13.945	+ 5.819	−12.734	− 7.654
c_5	− 3.116	− 0.340	+ 3.453	+ 1.142	− 4.140	− 2.092	+ 4.343	+ 2.908
c_6	+ 0.809	+ 0.106	− 0.912	− 0.368	+ 1.151	+ 0.712	− 1.325	− 1.044
c_7	− 0.208	− 0.033	+ 0.235	+ 0.115	− 0.303	− 0.227	+ 0.369	+ 0.352
c_8	+ 0.052	+ 0.010	− 0.059	− 0.034	+ 0.077	+ 0.070	− 0.098	− 0.112
c_9	− 0.014	− 0.003	+ 0.016	+ 0.010	− 0.019	− 0.021	+ 0.024	+ 0.034
c_{10}	+ 0.005	+ 0.001	− 0.005	− 0.003	+ 0.005	+ 0.006	− 0.006	− 0.010
c_{11}	− 0.003	0.000	+ 0.002	+ 0.002	− 0.002	− 0.003	+ 0.002	+ 0.003
c_{12}	+ 0.001	0.000	− 0.001	0.000	+ 0.001	0.000	0.000	− 0.001

	$i=0$	$i=1$	$i=2$	$i=3$	$i=4$	$i=5$	$i=6$	$i=7$
s_1	+152.710	+120.449	−68.257	−186.014	−37.299	+109.392	+59.417	−38.076
s_2	− 22.442	− 34.935	+13.315	+ 79.306	+13.435	− 71.335	−32.221	+38.974
s_3	+ 7.188	+ 12.593	− 2.626	− 30.901	− 6.679	+ 33.272	+14.594	−23.498
s_4	− 1.001	− 3.558	− 0.169	+ 9.755	+ 3.079	− 12.381	− 6.073	+10.544
s_5	+ 0.032	+ 0.977	+ 0.331	− 2.785	− 1.255	+ 3.961	+ 2.318	− 3.941
s_6	+ 0.050	− 0.259	− 0.160	+ 0.759	+ 0.460	− 1.154	− 0.837	+ 1.282
s_7	− 0.031	+ 0.065	+ 0.062	− 0.195	− 0.153	+ 0.311	+ 0.279	− 0.376
s_8	+ 0.013	− 0.016	− 0.021	+ 0.048	+ 0.048	− 0.079	− 0.088	+ 0.101
s_9	− 0.005	+ 0.004	+ 0.007	− 0.011	− 0.014	+ 0.020	+ 0.027	− 0.025
s_{10}	+ 0.002	− 0.001	− 0.002	+ 0.003	+ 0.004	− 0.004	− 0.007	+ 0.006
s_{11}	0.000	0.000	+ 0.001	0.000	− 0.001	+ 0.001	+ 0.002	− 0.001

	$i=8$	$i=9$	$i=10$	$i=11$	$i=12$	$i=13$	$i=14$	$i=15$	$i=16$
c_0	+ 1.446	+39.905	+ 7.786	−12.480	−5.134	+3.304	+2.351	−0.693	−0.911
c_1	−19.451	−37.916	− 0.781	+15.112	+3.728	−4.936	−2.469	+1.277	+1.158
c_2	+26.280	+29.260	− 5.794	−15.334	−1.139	+6.426	+2.020	−2.161	−1.311
c_3	−17.655	−16.149	+ 6.660	+10.650	−0.937	−5.606	−0.908	+2.393	+0.984
c_4	+ 8.811	+ 7.597	− 4.418	− 5.912	+1.316	+3.712	+0.156	−1.911	−0.533
c_5	− 3.562	− 3.189	+ 2.187	+ 2.808	−0.903	−2.025	+0.101	+1.211	+0.222
c_6	+ 1.237	+ 1.231	− 0.888	− 1.193	+0.454	+0.961	−0.110	−0.650	−0.074
c_7	− 0.382	− 0.443	+ 0.310	+ 0.464	−0.184	−0.409	+0.060	+0.307	+0.022
s_8	+ 0.107	+ 0.150	− 0.096	− 0.168	+0.063	+0.160	−0.024	−0.131	−0.007
c_9	− 0.028	− 0.048	+ 0.026	+ 0.057	−0.019	−0.058	+0.008	+0.051	+0.003
c_{10}	+ 0.007	+ 0.014	− 0.007	− 0.018	+0.004	+0.020	−0.001	−0.019	−0.002
c_{11}	− 0.002	− 0.005	+ 0.001	+ 0.006	−0.001	−0.007	0.000	+0.007	+0.001
c_{12}	+ 0.001	+ 0.001	0.000	− 0.002	0.000	+0.002	0.000	−0.002	0.000
s_1	−39.585	+ 6.100	+18.492	+ 2.230	−6.746	−2.470	+1.944	+1.342	−0.401
s_2	+30.498	−13.286	−19.297	+ 1.437	+9.305	+1.692	−3.569	−1.563	+1.070
s_3	−16.440	+11.375	+12.858	− 3.237	−7.698	−0.265	+3.684	+1.024	−1.418
s_4	+ 7.440	− 6.428	− 6.700	+ 2.649	+4.729	−0.413	−2.703	−0.428	+1.266
s_5	− 3.017	+ 2.873	+ 3.020	− 1.497	−2.421	+0.438	+1.594	+0.109	−0.872
s_6	+ 1.135	− 1.076	− 1.228	+ 0.667	+1.089	−0.263	−0.805	−0.002	+0.500
s_7	− 0.398	+ 0.352	+ 0.460	− 0.249	−0.444	+0.119	+0.361	−0.011	−0.250
s_8	+ 0.131	− 0.103	− 0.161	+ 0.081	+0.166	−0.043	−0.147	+0.007	+0.112
s_9	− 0.040	+ 0.027	+ 0.053	− 0.023	−0.058	+0.013	+0.056	−0.003	−0.046
s_{10}	+ 0.012	− 0.007	− 0.017	+ 0.006	+0.020	−0.003	−0.020	0.000	+0.018
s_{11}	− 0.003	+ 0.002	+ 0.005	− 0.001	−0.005	+0.001	+0.006	−0.002	−0.005

$Y^{(5)}_{i,s}$

	$i=1$	$i=2$	$i=3$	$i=4$	$i=5$	$i=6$	$i=7$	$i=8$
c_0	−1114.619	−347.050	+519.795	+306.726	−152.675	−163.878	+22.202	+67.077
c_1	+ 406.837	+ 75.156	−291.655	−119.655	+139.296	+ 97.715	−43.829	−55.467
c_2	− 133.852	− 14.951	+124.974	+ 35.395	− 88.074	− 45.123	+43.504	+36.694
c_3	+ 42.158	+ 6.622	− 43.463	− 13.269	+ 37.556	+ 18.169	−24.608	−18.072
c_4	− 11.572	− 1.925	+ 13.361	+ 4.491	− 13.769	− 6.931	+10.986	+ 7.878
c_5	+ 3.205	+ 0.715	− 3.798	− 1.610	+ 4.354	+ 2.543	− 4.067	− 3.134
c_6	− 0.836	− 0.226	+ 1.024	+ 0.533	− 1.261	− 0.887	+ 1.319	+ 1.163
c_7	+ 0.214	+ 0.070	− 0.266	− 0.168	+ 0.341	+ 0.292	− 0.387	− 0.405
c_8	− 0.054	− 0.021	+ 0.067	+ 0.050	− 0.088	− 0.091	+ 0.105	+ 0.133
c_9	+ 0.014	+ 0.006	− 0.017	− 0.015	+ 0.022	+ 0.027	− 0.027	− 0.041
c_{10}	− 0.004	− 0.002	+ 0.005	+ 0.005	− 0.006	− 0.008	+ 0.006	+ 0.012
c_{11}	+ 0.002	+ 0.001	− 0.002	− 0.002	+ 0.002	+ 0.003	− 0.002	− 0.004
c_{12}	− 0.001	0.000	+ 0.001	0.000	− 0.001	− 0.001	+ 0.001	+ 0.001
s_1	− 128.540	−182.877	+ 5.949	+153.520	+ 57.310	− 68.799	−51.376	+17.849
s_2	+ 20.103	+ 63.394	− 1.021	− 80.948	− 25.446	+ 55.710	+33.457	−24.357
s_3	− 5.957	− 23.480	− 1.825	+ 34.108	+ 11.491	− 29.300	−16.371	+17.184
s_4	+ 0.700	+ 6.912	+ 1.492	− 11.662	− 4.689	+ 11.928	+ 7.029	− 8.586
s_5	+ 0.063	+ 1.921	− 0.747	+ 3.496	+ 1.800	− 4.112	− 2.743	+ 3.497
s_6	− 0.078	+ 0.514	+ 0.291	− 0.979	− 0.648	+ 1.260	+ 1.006	− 1.217
s_7	+ 0.037	− 0.130	− 0.101	+ 0.257	+ 0.214	− 0.353	− 0.343	+ 0.376
s_8	− 0.015	+ 0.032	+ 0.033	− 0.065	− 0.067	+ 0.092	+ 0.110	− 0.105
s_9	+ 0.006	− 0.007	− 0.010	+ 0.015	+ 0.020	− 0.022	− 0.033	+ 0.027
s_{10}	− 0.002	+ 0.002	+ 0.003	− 0.004	− 0.006	+ 0.005	+ 0.010	− 0.006
s_{11}	+ 0.002	0.000	− 0.001	+ 0.001	+ 0.002	− 0.001	− 0.003	+ 0.001

	$i=9$	$i=10$	$i=11$	$i=12$	$i=13$	$i=14$	$i=15$	$i=16$
c_0	+ 6.280	−22.767	− 6.796	+ 6.568	+3.572	−1.574	−1.487	+0.269
c_1	+ 5.834	+24.548	+ 3.310	− 8.858	−3.232	+2.599	+1.740	−0.569
c_2	−13.852	−21.824	+ 1.149	+10.194	+1.972	−3.837	−1.715	+1.134
c_3	+11.522	+13.515	− 3.178	− 7.936	−0.328	+3.761	+1.062	−1.441
c_4	− 6.530	− 6.894	+ 2.654	+ 4.805	−0.400	−2.729	−0.439	+1.273
c_5	+ 2.904	+ 3.072	− 1.499	− 2.442	+0.435	+1.601	+0.109	−0.874
c_6	− 1.087	− 1.241	+ 0.669	+ 1.095	−0.263	−0.808	−0.003	+0.502
c_7	+ 0.356	+ 0.464	− 0.250	− 0.445	+0.119	+0.361	−0.013	−0.249
c_8	− 0.104	− 0.162	+ 0.081	+ 0.167	−0.044	−0.147	+0.007	+0.111
c_9	+ 0.028	+ 0.053	− 0.023	− 0.060	+0.013	+0.057	−0.002	−0.047
c_{10}	− 0.007	− 0.017	+ 0.006	+ 0.019	−0.003	−0.019	0.000	+0.017
c_{11}	+ 0.002	+ 0.005	− 0.001	− 0.006	0.000	+0.006	+0.001	−0.006
c_{12}	0.000	− 0.001	0.000	+ 0.002	0.000	−0.002	0.000	+0.002
s_1	+28.009	− 0.176	−11.491	− 2.769	+3.738	+1.905	−0.935	−0.890
s_2	−25.226	+ 5.853	+13.807	+ 0.813	−5.927	−1.804	+2.023	+1.208
s_3	+15.098	− 6.663	−10.250	+ 1.007	+5.469	+0.859	−2.352	−0.959
s_4	− 7.300	+ 4.381	+ 5.788	− 1.325	−3.666	−0.145	+1.896	+0.527
s_5	+ 3.109	− 2.175	− 2.775	+ 0.906	+2.012	−0.105	−1.207	−0.219
s_6	− 1.212	+ 0.884	+ 1.184	− 0.453	−0.957	+0.110	+0.648	+0.074
s_7	+ 0.438	− 0.308	− 0.462	+ 0.183	+0.409	−0.059	−0.306	−0.023
s_8	− 0.149	+ 0.095	+ 0.167	− 0.064	−0.160	+0.025	+0.131	+0.006
s_9	+ 0.048	− 0.026	− 0.057	+ 0.019	+0.058	−0.007	−0.052	−0.003
s_{10}	− 0.014	+ 0.006	+ 0.018	− 0.004	−0.020	+0.001	+0.019	+0.003
s_{11}	+ 0.004	− 0.001	− 0.005	+ 0.002	+0.006	−0.001	−0.006	0.000

$Y^{(7)}_{i.c}$

	$i=0$	$i=1$	$i=2$	$i=3$	$i=4$	$i=5$	$i=6$
c_0	+1403.68	+261.36	−1049.96	−506.66	+487.17	+411.93	−139.53
c_1	− 676.72	− 81.24	+ 590.39	+210.93	−373.61	−234.58	+164.71
c_2	+ 262.60	+ 17.13	− 255.48	− 58.21	+214.09	+ 95.44	−136.26
c_3	− 97.74	− 6.47	+ 98.63	+ 21.27	− 93.60	− 37.32	+ 73.71
c_4	+ 31.78	+ 1.85	− 33.66	− 6.83	+ 35.96	+ 13.88	− 33.10
c_5	− 10.10	− 0.71	+ 10.85	+ 2.55	− 12.34	− 5.16	+ 12.74
c_6	+ 2.99	+ 0.25	− 3.30	− 0.91	+ 3.98	+ 1.89	− 4.49
c_7	− 0.90	− 0.05	+ 0.97	+ 0.29	− 1.20	− 0.66	+ 1.38
c_8	+ 0.26	+ 0.03	− 0.26	− 0.09	+ 0.28	+ 0.22	− 0.42
c_9	− 0.04	+ 0.01	+ 0.09	+ 0.01	− 0.10	− 0.08	+ 0.11
c_{10}	+ 0.06	− 0.01	0.00	− 0.05	+ 0.01	+ 0.02	+ 0.02
c_{11}	+ 0.04	− 0.04	− 0.01	+ 0.03	+ 0.07	0.00	+ 0.01
c_{12}	+ 0.01	+ 0.01	0.00	− 0.02	+ 0.04	− 0.02	− 0.01
s_1	+ 227.69	+138.34	− 123.47	−258.33	− 37.57	+186.19	+100.15
s_2	− 76.72	− 60.07	+ 49.68	+141.29	+ 13.56	−139.45	− 62.39
s_3	+ 27.48	+ 25.33	− 17.25	− 63.78	− 6.83	+ 73.22	+ 30.17
s_4	− 7.63	− 8.97	+ 4.41	+ 24.15	+ 3.89	− 31.10	− 13.41
s_5	+ 1.77	+ 2.88	− 0.75	− 8.14	− 1.98	+ 11.42	+ 5.50
s_6	− 0.40	− 0.89	+ 0.04	+ 2.59	+ 0.91	− 3.82	− 2.18
s_7	+ 0.03	+ 0.26	+ 0.07	− 0.76	− 0.32	+ 1.20	+ 0.80
s_8	− 0.01	− 0.11	− 0.05	+ 0.21	+ 0.13	− 0.38	− 0.27
s_9	0.00	+ 0.05	+ 0.03	− 0.06	− 0.07	+ 0.12	+ 0.09
s_{10}	0.00	− 0.01	− 0.02	+ 0.05	− 0.08	− 0.01	− 0.03
s_{11}	− 0.01	0.00	+ 0.03	+ 0.09	− 0.07	+ 0.01	+ 0.01

	$i=7$	$i=8$	$i=9$	$i=10$	$i=11$	$i=12$	$i=13$	$i=14$
c_0	−231.59	+ 7.68	+102.83	+19.80	−37.92	−15.88	+11.67	+8.49
c_1	+173.53	−42.91	− 97.27	− 3.31	+43.69	+11.75	−16.11	−8.58
c_2	−100.11	+60.72	+ 75.31	−14.42	−43.72	− 3.85	+20.29	+6.87
c_3	+ 46.67	−44.14	− 43.36	+17.99	+31.30	− 2.57	−17.97	−3.14
c_4	− 19.82	+24.03	+ 21.33	−12.87	−18.04	+ 4.05	+12.26	+0.59
c_5	+ 7.95	−10.71	− 9.41	+ 6.90	+ 9.02	− 3.03	− 6.98	+0.36
c_6	− 3.03	+ 4.16	+ 3.83	− 3.06	− 4.00	+ 1.65	+ 3.45	−0.42
c_7	+ 1.15	− 1.43	− 1.49	+ 1.20	+ 1.56	− 0.73	− 1.56	+0.24
c_8	− 0.38	+ 0.43	+ 0.51	− 0.43	− 0.62	+ 0.25	+ 0.64	−0.13
c_9	+ 0.13	− 0.14	− 0.18	+ 0.13	+ 0.14	− 0.09	− 0.27	0.00
c_{10}	− 0.03	+ 0.04	+ 0.07	− 0.02	− 0.08	+ 0.01	+ 0.11	−0.05
c_{11}	+ 0.01	− 0.03	− 0.03	+ 0.01	+ 0.09	− 0.03	− 0.07	+0.02
c_{12}	+ 0.01	+ 0.02	− 0.01	0.00	− 0.02	+ 0.01	+ 0.02	−0.01

	$i=7$	$i=8$	$i=9$	$i=10$	$i=11$	$i=12$	$i=13$	$i=14$
s_1	− 79.09	−82.35	+16.40	+45.55	+4.84	−19.33	− 7.09	+ 6.46
s_2	+85.66	+69.56	−33.08	−50.11	+4.17	+27.23	+5.12	−11.67
s_3	−56.19	−40.03	+29.84	+35.10	−9.29	−22.81	−0.87	+12.25
s_4	+27.82	+19.25	−18.14	−19.26	+8.05	+14.87	−1.34	− 9.28
s_5	−11.55	− 8.28	+ 8.17	+ 9.16	−4.89	− 7.95	+1.55	+ 5.68
s_6	+ 4.26	+ 3.38	− 3.66	− 3.94	+2.36	+ 3.75	−0.98	− 3.05
s_7	− 1.39	− 1.26	+ 0.69	+ 1.56	−0.99	− 1.63	+0.49	+ 1.42
s_8	+ 0.42	+ 0.47	− 0.46	− 0.60	+0.35	+ 0.67	−0.20	− 0.60
s_9	− 0.13	− 0.15	+ 0.14	+ 0.24	−0.11	− 0.69	+0.07	+ 0.25
s_{10}	+ 0.02	+ 0.04	− 0.04	− 0.07	+0.03	+ 0.11	0.00	− 0.09
s_{11}	− 0.01	+ 0.07	0.00	− 0.01	−0.02	− 0.01	+0.01	+ 0.04

$Y^{(7)}_{i,s}$

	$i=1$	$i=2$	$i=3$	$i=4$	$i=5$	$i=6$	$i=7$
c_0	−1298.92	−438.72	+755.14	+485.41	−280.39	−319.86	+53.76
c_1	+ 655.64	+155.85	−490.11	−237.18	+260.52	+210.08	−92.27
c_2	− 261.32	− 36.33	+240.55	+ 79.49	−177.70	−102.55	+95.79
c_3	+ 98.10	+ 13.50	− 97.71	− 29.53	+ 85.51	+ 43.43	−59.32
c_4	− 32.29	− 4.02	+ 35.15	+ 10.24	− 35.39	− 17.24	+29.12
c_5	+ 10.30	+ 1.35	− 11.62	− 3.77	+ 12.80	+ 6.61	−12.02
c_6	− 3.12	− 0.55	+ 3.64	+ 1.39	− 4.25	− 2.45	+ 4.37
c_7	+ 0.88	+ 0.39	− 1.08	− 0.51	+ 1.34	+ 0.91	− 1.46
c_8	− 0.23	− 0.10	+ 0.31	+ 0.18	− 0.39	− 0.28	+ 0.44
c_9	+ 0.06	+ 0.02	− 0.05	− 0.05	+ 0.05	+ 0.09	− 0.10
c_{10}	− 0.02	− 0.03	+ 0.01	+ 0.01	− 0.04	− 0.03	+ 0.05
c_{11}	+ 0.02	+ 0.01	− 0.03	+ 0.02	+ 0.02	0.00	− 0.01
c_{12}	0.00	− 0.01	+ 0.01	+ 0.01	+ 0.01	0.00	+ 0.01
s_1	− 198.27	−229.71	+ 35.57	+236.29	+ 82.75	−129.31	−97.03
s_2	+ 69.72	+109.98	− 19.73	−150.34	− 42.72	+115.30	+70.87
s_3	− 24.81	− 47.53	+ 6.14	+ 72.47	+ 19.55	− 67.10	−37.19
s_4	+ 6.81	+ 17.31	− 0.62	− 28.89	− 8.83	+ 30.61	+17.01
s_5	− 1.48	− 5.65	− 0.43	+ 3.74	+ 3.74	− 11.91	− 7.08
s_6	+ 0.30	+ 1.75	+ 0.38	− 3.26	− 1.48	+ 4.17	+ 2.81
s_7	− 0.02	− 0.53	− 0.19	+ 0.56	+ 0.56	− 1.33	− 1.04
s_8	− 0.03	+ 0.15	+ 0.10	− 0.29	− 0.23	+ 0.41	+ 0.37
s_9	+ 0.01	− 0.01	− 0.06	+ 0.05	+ 0.07	− 0.12	− 0.09
s_{10}	0.00	− 0.02	+ 0.01	− 0.08	− 0.02	+ 0.06	+ 0.05
s_{11}	− 0.01	+ 0.01	− 0.03	+ 0.03	− 0.03	− 0.01	− 0.03

	$i=8$	$i=9$	$i=10$	$i=11$	$i=12$	$i=13$	$i=14$
c_0	+158.29	+13.18	−63.81	−19.20	+21.53	+11.95	− 5.98
c_1	−133.86	+12.78	+66.93	+10.21	−27.22	−10.66	+ 8.96
c_2	+ 90.04	−33.45	−59.08	+ 2.52	+30.57	+ 6.46	−12.79
c_3	− 46.58	+29.91	+37.90	− 8.83	−24.32	− 1.31	+12.64
c_4	+ 21.23	−18.34	−20.18	+ 7.99	+15.26	− 1.21	− 9.39
c_5	− 8.92	+ 8.90	+ 9.46	− 4.86	− 8.12	+ 1.49	+ 5.69
c_6	+ 3.52	− 3.67	− 4.05	+ 2.37	+ 3.82	− 0.99	− 2.99
c_7	− 1.30	+ 1.34	+ 1.58	− 1.00	− 1.62	+ 0.49	+ 1.39
c_8	+ 0.49	− 0.44	− 0.58	+ 0.35	+ 0.66	− 0.21	− 0.59
c_9	− 0.16	+ 0.13	+ 0.20	− 0.11	− 0.24	+ 0.05	+ 0.26
c_{10}	+ 0.04	− 0.03	− 0.06	+ 0.02	+ 0.11	0.00	− 0.09
c_{11}	− 0.04	− 0.02	+ 0.03	− 0.03	− 0.04	0.00	+ 0.04
c_{12}	− 0.01	0.00	− 0.01	+ 0.01	+ 0.02	− 0.01	− 0.02
s_1	+ 41.27	+63.65	− 2.08	−30.56	− 7.18	+11.50	+ 5.89
s_2	− 56.97	−61.50	+15.54	+38.08	+ 2.21	−18.32	− 5.81
s_3	+ 42.98	+39.01	−18.32	−29.46	+ 3.02	+17.35	+ 2.88
s_4	− 23.40	−19.97	+12.84	+17.41	− 4.19	−12.04	− 0.55
s_5	+ 10.51	+ 9.02	− 6.89	− 8.78	+ 3.08	+ 7.15	− 0.33
s_6	− 4.05	− 3.71	+ 3.04	+ 3.95	− 1.65	− 3.42	− 0.45
s_7	+ 1.43	+ 1.42	− 1.17	− 1.64	+ 0.78	+ 1.79	− 0.23
s_8	− 0.46	− 0.53	+ 0.42	+ 0.63	− 0.27	− 0.66	+ 0.11
s_9	+ 0.12	+ 0.17	− 0.14	− 0.24	+ 0.10	+ 0.25	− 0.04
s_{10}	− 0.03	− 0.06	+ 0.04	+ 0.10	− 0.03	− 0.08	+ 0.01
s_{11}	− 0.01	+ 0.01	0.00	− 0.02	0.00	+ 0.06	− 0.01

5.

Nach Angabe von Hansen habe ich die Kontrolle der c und s Koeffizienten durch Einsetzen von drei verschiedenen Werten von ε nämlich $\varepsilon = 0^0$, 15^0 und 30^0 in den Gleichungen

$$Y^{(n)}_{i\,.\,\substack{c\\s}} = \frac{1}{2}\, C^{n\,.\,\substack{c\\s}}_{0\,.\,i} + \sum_{\nu=1} C^{n\,.\,\substack{c\\s}}_{\nu\,.\,i} \cos \nu\varepsilon + \sum_{\nu=1} S^{n\,.\,\substack{c\\s}}_{\nu\,.\,i} \sin \nu\varepsilon$$

ausgeführt, wobei ich vollständige Übereinstimmung zwischen der linken und rechten Seite fand. Diese Kontrolle kontrollirt aber nur etwa die Hälfte aller dieser c und s Koeffizienten, während beliebige Fehler in den übrigen doch vollständige Übereinstimmung in der Kontrolle geben kann. Ich habe daher die Kontrolle für ein $\varepsilon = 23^0 30'$, das nicht zu den aliquoten Teilen gehört, ausgeführt, welches ich so gewählt, dass die Quantitäten, die gar nicht in der vorigen Kontrolle kontrollirt wurden, in dieser möglichst genau kontrollirt sind, und glaube dadurch eine sichere Kontrolle aller Koeffizienten bekommen zu haben. Zu diesem zwecke habe ich zuerst die numerischen Werte von β und Y für $\varepsilon = 23^0 30'$ ausgerechnet. Eine andere Kontrolle liegt auch darin, dass die c_{12} und s_{11} immer klein sein müssen.

Nach dem diese c und s Koeffizienten berechnet sind, erhält man die Koeffizienten in der Entwickelung von $A^{-n/2}$ aus der Formel

$$A^{-n/2} = \sum_{i=0} \sum_{\nu=0} (C^{n\,.\,c}_{\nu\,.\,i} \pm S^{n\,.\,s}_{\nu\,.\,i}) \cos [(i \pm \nu)\varepsilon - i\varepsilon']$$

$$- \sum_{i=0} \sum_{\nu=0} (C^{n\,.\,s}_{\nu\,.\,i} \mp S^{n\,.\,c}_{\nu\,.\,i}) \sin [(i \pm \nu)\varepsilon - i\varepsilon']$$

wo zu bemerken ist, dass

$$C^{n\,.\,s}_{0\,.\,0} = C^{n\,.\,s}_{\nu\,.\,0} = S^{n\,.\,s}_{\nu\,.\,0} = S^{n\,.\,c}_{0\,.\,i} = S^{n\,.\,s}_{0\,.\,i} = 0$$

und für $i = o$ nur die oberen Zeichen gelten und dass $C^{n\,.\,c}_{0\,.\,0}$ zweimal zu gross ist. Die in den folgenden Tabellen in der Kolumne *sin* angegebenen Koeffizienten sind $(C^{n\,.\,s}_{\nu\,.\,i} \mp S^{n\,.\,c}_{\nu\,.\,i})$ und nicht $-(C^{n\,.\,s}_{\nu\,.\,i} \mp S^{n\,.\,c}_{\nu\,.\,i})$.

ε	ε'	$A^{-1/2}$ cos	$A^{-1/2}$ sin	$A^{-3/2}$ cos	$A^{-3/2}$ sin	$A^{-5/2}$ cos	$A^{-5/2}$ sin	$A^{-7/2}$ cos	$A^{-7/2}$ sin
0.	0	+220.5484*		+415.115*		+1285.07*		+1403.7*	
1.	0	− 3.36676	− 1.3536	− 59.1075	− 23.5320	− 414.973	− 152.710	− 676.7	− 227.7
2.	0	+ 0.98983	− 0.4241	+ 15.7391	− 0.8941	+ 133.577	+ 22.442	+ 262.6	+ 76.7
3.	0	− 0.1273	+ 0.0174	− 3.630	− 0.140	− 41.59	− 7.19	− 97.7	− 27.5
4.	0	+ 0.0206	− 0.0114	+ 0.772	− 0.106	+ 11.26	+ 1.00	+ 31.8	+ 7.6
5.	0	− 0.0040	+ 0.0019	− 0.182	+ 0.036	− 3.12	− 0.03	− 10.1	− 1.8
6.	0	+ 0.0007	− 0.0004	+ 0.039	− 0.012	+ 0.81	− 0.05	+ 3.0	+ 0.4
7.	0	− 0.0001	+ 0.0001	− 0.009	+ 0.004	− 0.21	+ 0.03	− 0.9	0.0
8.	0	0.0000	0.0000	+ 0.002	− 0.001	+ 0.05	− 0.01	+ 0.3	0.0
9.	0	0.0000	0.0000	− 0.001	0.000	− 0.01	+ 0.01	0.0	0.0
−10.	−1	− 0.0000	0.0000	+ 0.001	0.000	0.00	0.00	0.0	0.0
− 9.	−1	+ 0.0000	0.0000	0.000	− 0.001	0.00	− 0.01	0.0	0.0
− 8.	−1	0.0000	0.0000	− 0.001	+ 0.001	− 0.01	+ 0.02	0.0	+ 0.1
− 7.	−1	0.0000	0.0000	+ 0.002	− 0.003	+ 0.02	− 0.07	0.0	− 0.3
− 6.	−1	− 0.0002	+ 0.0002	− 0.007	+ 0.012	− 0.07	+ 0.28	0.0	+ 1.1
− 5.	−1	+ 0.0008	− 0.0009	+ 0.022	− 0.054	+ 0.18	− 1.09	− 0.1	− 4.0
− 4.	−1	− 0.0037	+ 0.0059	− 0.078	+ 0.253	− 0.40	+ 4.18	+ 0.8	+ 13.2
− 3.	−1	+ 0.0202	− 0.0311	+ 0.242	− 1.093	+ 0.20	− 15.13	− 5.0	− 41.3
− 2.	−1	− 0.0588	+ 0.2163	− 0.428	+ 5.201	+ 2.74	+ 54.75	+ 18.3	+ 123.4
− 1.	−1	+ 0.8679	− 1.7694	+ 2.390	− 21.230	− 12.76	− 168.79	− 52.6	− 321.4
0.	−1	+ 3.1686	+12.8391	+ 19.954	+ 93.438	+ 94.13	+ 527.29	+ 117.0	+ 794.0
1.	−1	+ 12.0192	−56.9036	+ 59.506	−284.298	+ 229.36	−1114.62	+ 261.4	− 1298.9
2.	−1	− 0.6385	+ 1.2643	− 19.563	+ 33.423	− 162.95	+ 286.39	− 279.5	+ 517.3
3.	−1	− 0.1646	− 0.6018	+ 0.449	− 10.949	+ 27.45	− 98.92	+ 86.9	− 201.3
4.	−1	− 0.0004	+ 0.0725	− 0.411	+ 2.376	− 9.18	+ 29.57	− 31.3	+ 72.8
5.	−1	− 0.0058	− 0.0135	− 0.021	− 0.528	+ 1.60	− 8.01	+ 8.7	− 23.3
6.	−1	+ 0.0008	+ 0.0026	+ 0.009	+ 0.125	− 0.28	+ 2.23	− 2.2	+ 7.4
7.	−1	− 0.0002	− 0.0004	− 0.005	− 0.026	+ 0.03	+ 0.58	+ 0.6	− 2.2
8.	−1	+ 0.0001	+ 0.0001	+ 0.002	+ 0.006	0.00	+ 0.15	− 0.1	+ 0.6
9.	−1	0.0000	0.0000	− 0.001	− 0.002	− 0.01	− 0.04	0.0	− 0.1
10.	−1	0.0000	0.0000	0.000	+ 0.001	0.00	+ 0.01	0.0	0.0
11.	−1	0.0000	0.0000	+ 0.001	− 0.001	0.00	0.00	0.0	0.0
12.	−1	0.0000	0.0000	− 0.001	0.000	0.00	0.00	0.0	0.0
− 7.	−2	0.0000	0.0000	+ 0.001	+ 0.001	+ 0.02	+ 0.01	+ 0.1	+ 0.1
− 6.	−2	0.0000	− 0.0001	− 0.003	− 0.003	− 0.09	− 0.04	− 0.4	− 0.2
− 5.	−2	+ 0.0002	+ 0.0003	+ 0.016	+ 0.010	+ 0.37	+ 0.13	+ 1.5	+ 0.5
− 4.	−2	− 0.0014	− 0.0013	− 0.074	− 0.038	− 1.43	− 0.39	− 5.1	− 0.5
− 3.	−2	+ 0.0084	+ 0.0065	+ 0.339	+ 0.139	+ 5.37	+ 1.05	+ 16.5	+ 0.6
− 2.	−2	− 0.0478	− 0.0327	− 1.483	− 0.431	− 19.30	− 2.09	− 51.0	+ 0.4
− 1.	−2	+ 0.3814	+ 0.1331	+ 6.851	+ 1.253	+ 66.77	+ 4.00	+ 146.2	− 3.8
0.	−2	− 1.9336	− 0.3900	− 25.121	− 2.269	− 195.90	− 1.64	− 365.5	+ 13.4
1.	−2	+ 9.6846	− 0.3545	+ 92.552	− 1.343	+ 546.04	+ 12.30	+ 820.1	+ 32.4
2.	−2	− 20.5452	− 9.0555	−165.420	− 72.088	− 811.27	− 347.05	−1050.0	− 438.7
3.	−2	+ 0.5475	+ 0.3012	+ 17.900	+ 14.008	+ 180.28	+ 138.01	+ 360.7	+ 279.3
4.	−2	− 0.3541	+ 0.0357	− 7.205	− 1.210	− 69.11	− 28.27	− 145.5	− 86.0
5.	−2	+ 0.0400	+ 0.0059	+ 1.473	+ 0.472	+ 19.81	+ 9.25	+ 51.1	+ 30.8
6.	−2	− 0.0087	+ 0.0025	− 0.349	− 0.023	− 5.48	− 1.76	− 16.4	− 8.4
7.	−2	+ 0.0016	− 0.0003	+ 0.083	+ 0.004	+ 1.53	+ 0.38	+ 5.2	+ 2.1
8.	−2	− 0.0003	+ 0.0001	− 0.018	+ 0.001	− 0.40	− 0.07	− 1.6	− 0.6
9.	−2	+ 0.0001	0.0000	+ 0.004	− 0.001	+ 0.10	+ 0.01	+ 0.4	+ 0.3
10.	−2	0.0000	0.0000	− 0.001	0.000	− 0.03	0.00	− 0.1	− 0.1
− 6.	−3	0.0000	0.0000	+ 0.001	− 0.001	+ 0.02	− 0.03	+ 0.1	− 0.1
− 5.	−3	− 0.0001	+ 0.0001	− 0.004	+ 0.004	− 0.07	+ 0.12	− 0.2	+ 0.5
− 4.	−3	+ 0.0004	− 0.0003	+ 0.016	− 0.021	+ 0.22	− 0.46	+ 0.5	− 1.8
− 3.	−3	− 0.0020	+ 0.0019	− 0.059	+ 0.096	− 0.66	+ 1.78	− 1.3	+ 6.2
− 2.	−3	+ 0.0102	− 0.0120	+ 0.213	− 0.434	+ 1.89	− 6.58	+ 3.0	− 19.8
− 1.	−3	− 0.0400	+ 0.0727	− 0.642	+ 1.890	− 4.63	+ 23.12	− 6.2	+ 59.3
0.	−3	+ 0.14513	− 0.41660	+ 1.9029	− 7.6897	+ 11.812	− 74.364	+ 15.13	− 161.49

* 2 mal zu gross.

ε ε'	$A^{-1/2}$		$A^{-3/2}$		$A^{-5/2}$		$A^{-7/2}$	
	cos	sin	cos	sin	cos	sin	cos	sin
1. — 3	−0.30220	+1.70668	− 3.7011	+25.4220	− 23.955	+204.280	− 38.48	+381.84
2. — 3	+1.02509	−5.97361	+13.7835	−72.9179	+100.845	−477.668	+175.36	−748.44
3. — 3	−5.5636	+7.7862	−61.289	+87.063	−358.03	+519.80	−506.7	+755.1
4. — 3	+0.1477	−0.2648	+ 9.278	− 9.299	+112.74	−105.64	+246.5	−231.8
5. — 3	−0.0157	+0.1992	− 1.437	+ 4.495	− 26.00	+ 45.67	− 77.9	+ 99.3
6. — 3	+0.0063	−0.0215	+ 0.422	− 0.872	+ 8.16	− 12.56	+ 27.4	− 33.9
7. — 3	+0.0008	+0.0054	− 0.042	+ 0.224	− 1.65	+ 3.61	− 7.5	+ 11.0
8. — 3	0.0000	−0.0010	+ 0.010	− 0.053	+ 0.40	− 1.01	+ 2.1	− 3.5
9. — 3	0.0000	+0.0002	− 0.001	+ 0.012	− 0.08	+ 0.27	− 0.5	+ 1.1
10. — 3	0.0000	0.0000	0.000	− 0.003	+ 0.01	− 0.07	+ 0.1	− 0.3
11. — 3	0.0000	0.0000	0.000	+ 0.001	0.00	+ 0.02	0.0	+ 0.1
− 5. — 4	0.0000	0.0000	− 0.001	− 0.002	− 0.04	− 0.03	− 0.2	− 0.1
− 4. — 4	+0.0001	+0.0001	+ 0.006	+ 0.006	+ 0.14	+ 0.10	+ 0.6	+ 0.3
− 2. — 4	−0.0004	−0.0006	− 0.026	− 0.023	− 0.56	− 0.32	− 1.8	− 0.8
− 2. — 4	+0.0027	+0.0029	+ 0.120	+ 0.083	+ 2.13	+ 0.99	+ 7.2	+ 2.3
− 1. — 4	−0.0157	−0.0126	− 0.522	− 0.285	− 7.64	− 2.87	− 16.1	− 5.8
0. — 4	+0.0849	+0.0440	+ 2.141	+ 0.849	+ 25.61	+ 7.57	+ 64.9	+ 14.1
1. — 4	−0.3770	−0.1422	− 7.607	− 2.433	− 75.76	− 19.95	−166.1	− 36.4
2. — 4	+1.2990	+0.3463	+22.323	+ 5.837	+190.41	+ 48.83	+364.4	+ 93.1
3. — 4	−3.3109	−1.3080	−49.626	−20.369	−365.14	−156.95	−609.9	−274.8
4. — 4	+2.9031	+3.1330	+41.940	+44.331	+298.32	+306.73	+487.2	+485.4
5. — 4	−0.1388	−0.0787	− 4.739	− 5.893	− 58.10	− 82.36	−137.3	−199.6
6. — 4	+0.1070	+0.0289	+ 2.657	+ 1.331	+ 28.51	+ 21.96	+ 63.8	+ 65.9
7. — 4	−0.0113	−0.0050	− 0.494	− 0.332	− 7.55	− 6.59	− 21.1	− 22.7
8. — 4	+0.0033	0.0000	+ 0.139	+ 0.045	+ 2.28	+ 1.41	+ 7.1	+ 6.4
9. — 4	−0.0006	−0.0001	− 0.033	− 0.011	− 0.64	− 0.35	− 8.6	− 1.8
10. — 4	+0.0001	0.0000	+ 0.008	+ 0.001	+ 0.17	+ 0.07	+ 0.7	+ 0.5
11. — 4	0.0000	0.0000	− 0.002	0.000	− 0.05	− 0.02	− 0.6	− 0.2
12. — 4	0.0000	0.0000	+ 0.001	+ 0.001	+ 0.01	0.00	0.0	+ 0.1
− 5. — 5	0.0000	0.0000	+ 0.001	0.000	+ 0.01	− 0.01	0.0	− 0.1
− 4. — 5	0.0000	0.0000	− 0.002	+ 0.001	− 0.04	+ 0.04	− 0.2	+ 0.2
− 3. — 5	+0.0002	−0.0001	+ 0.008	− 0.007	+ 0.14	− 0.17	+ 0.5	− 0.8
− 2. — 5	−0.0009	+0.0006	− 0.030	+ 0.031	− 0.44	+ 0.65	− 1.2	+ 2.5
− 1. — 5	+0.0037	−0.0034	+ 0.107	− 0.141	+ 1.36	− 2.42	+ 3.4	− 8.1
0. — 5	−0.0138	+0.0179	− 0.348	+ 0.579	− 3.89	+ 8.32	− 8.9	+ 24.2
1. — 5	+0.04551	−0.08258	+ 1.0265	− 2.1628	+ 10.507	− 26.149	+ 22.71	− 66.49
2. — 5	−0.13701	+0.30393	− 2.8473	+ 6.7819	− 27.364	+ 70.828	− 56.87	+158.73
3. — 5	+0.36756	−0.88257	+ 7.3275	−17.3658	+ 68.214	−159.408	+138.16	−317.15
4. — 5	−1.1108	+1.6888	−20.278	+30.150	−171.81	+248.69	−317.3	+446.7
5. — 5	+1.6723	−1.0185	+29.068	−18.269	+233.77	−152.68	+411.9	−280.4
6. — 5	−0.0465	+0.0758	− 3.663	+ 2.374	− 57.19	+ 29.90	−151.8	+ 74.3
7. — 5	+0.0266	−0.0548	+ 1.076	− 1.485	+ 17.32	− 16.74	+ 52.7	− 38.3
8. — 5	−0.0036	+0.0058	− 0.242	+ 0.268	− 4.98	+ 4.28	− 17.8	+ 12.3
9. — 5	+0.0003	−0.0019	+ 0.040	− 0.083	+ 1.13	− 1.39	+ 5.1	− 4.3
10. — 5	−0.0001	+0.0003	− 0.010	+ 0.019	− 0.29	+ 0.39	− 1.4	+ 1.4
11. — 5	0.0000	−0.0001	+ 0.001	− 0.005	+ 0.06	− 0.11	+ 0.4	− 0.4
12. — 5	0.0000	0.0000	0.000	+ 0.001	− 0.01	+ 0.03	− 0.1	+ 0.1
− 4. — 6	0.0000	0.0000	− 0.000	− 0.001	− 0.01	− 0.02	0.0	− 0.1
− 3. — 6	0.0000	+0.0001	+ 0.002	+ 0.003	+ 0.05	+ 0.05	+ 0.2	+ 0.2
− 2. — 6	−0.0001	−0.0002	− 0.008	− 0.010	− 0.19	− 0.18	− 0.8	− 0.6
− 1. — 6	+0.0007	+0.0010	+ 0.036	+ 0.038	+ 0.72	+ 0.57	+ 2.7	+ 1.7
0. — 6	−0.0038	−0.0041	− 0.153	− 0.128	− 2.59	− 1.73	− 8.7	− 4.6
1. — 6	+0.0179	+0.0142	+ 0.587	+ 0.398	+ 8.46	+ 4.86	+ 24.7	+ 12.1
2. — 6	−0.0709	−0.0447	− 1.979	− 1.147	− 24.66	− 13.01	− 63.7	− 30.7
3. — 6	+0.2235	+0.1276	+ 5.511	+ 3.064	+ 60.88	+ 32.76	+140.8	+ 73.6
4. — 6	−0.5450	−0.3366	−12.146	− 7.639	−120.56	− 77.34	−251.6	−164.9
5. — 6	+0.7938	+0.7954	+16.501	+16.786	+151.71	+157.13	+294.0	+310.2
6. — 6	−0.3133	−0.8581	− 6.860	−17.790	− 67.19	−163.88	−319.5	−319.9
7. — 6	+0.0416	+0.0297	+ 1.159	+ 2.255	+ 14.12	+ 38.30	+ 35.4	+109.9
8. — 6	−0.0266	−0.0198	− 0.780	− 0.794	− 9.14	− 12.90	− 21.0	− 40.2

ε ε'	$A^{-1/2}$		$A^{-3/2}$		$A^{-5/2}$		$A^{-7/2}$	
	cos	sin	cos	sin	cos	sin	cos	sin
9. — 6	+0.0029	+0.0024	+ 0.139	+0.166	+ 2.28	+ 3.58	+ 6.6	+ 13.3
10. — 6	−0.0011	−0.0004	− 0.048	−0.032	− 0.81	− 0.86	− 2.5	− 3.8
11. — 6	+0.0002	+0.0001	+ 0.011	+0.008	+ 0.23	+ 0.23	+ 0.8	+ 1.1
12. — 6	0.0000	0.0000	− 0.003	−0.001	− 0.07	− 0.05	− 0.3	− 0.3
13. — 6	0.0000	0.0000	+ 0.001	0.000	+ 0.02	+ 0.01	+ 0.1	+ 0.1
— 3. — 7	0.0000	0.0000	− 0.001	0.000	− 0.02	+ 0.01	− 0.1	+ 0.1
— 2. — 7	+0.0001	0.0000	+ 0.003	−0.002	+ 0.07	− 0.05	+ 0.2	− 0.3
— 1. — 7	−0.0003	+0.0001	− 0.013	+0.009	− 0.22	+ 0.21	− 0.8	+ 0.9
0. — 7	+0.0012	−0.0008	+ 0.044	−0.039	+ 0.70	− 0.76	+ 2.2	− 2.9
1. — 7	−0.0043	+0.0039	− 0.144	+0.154	− 2.05	+ 2.60	− 5.8	+ 8.6
2. — 7	+0.0139	−0.0160	+ 0.429	−0.546	+ 5.65	− 8.01	+ 15.0	− 23.6
3. — 7	−0.0417	+0.0553	− 1.193	+1.657	− 14.68	+21.53	− 36.8	+ 56.9
4. — 7	+0.1124	−0.1513	+ 3.029	−4.101	+ 35.20	−48.11	+ 83.9	−115.5
5. — 7	−0.2729	+0.3077	− 6.942	+7.683	− 76.06	+82.48	−171.0	+181.5
6. — 7	+0.5147	−0.3379	+12.380	−8.041	+127.70	−81.90	+270.6	−171.4
7. — 7	−0.4263	+0.0675	−10.323	+1.867	−107.68	+22.20	−231.6	+ 53.8
8. — 7	+0.0196	−0.0223	+ 1.381	−0.540	+ 24.94	− 5.75	+ 76.5	− 13.2
9. — 7	−0.0133	+0.0121	− 0.548	+0.379	− 9.14	+ 4.53	− 29.2	+ 10.1
10. — 7	+0.0015	−0.0015	+ 0.109	−0.068	+ 2.46	− 1.11	+ 9.5	− 3.1
11. — 7	−0.0003	+0.0006	− 0.024	+0.027	− 0.63	+ 0.44	− 2.8	+ 1.3
12. — 7	0.0000	−0.0001	+ 0.006	−0.006	+ 0.17	− 0.13	+ 0.9	− 0.5
13. — 7	0.0000	0.0000	− 0.001	+0.002	− 0.04	+ 0.04	− 0.2	+ 0.1
— 2. — 8	0.0000	0.0000	0.000	+0.001	+ 0.01	+ 0.02	+ 0.1	+ 0.1
— 1. — 8	0.0000	−0.0001	− 0.002	−0.004	− 0.06	− 0.08	− 0.3	− 0.3
0. — 8	+0.0002	+0.0003	+ 0.009	+0.015	+ 0.21	+ 0.26	+ 0.9	+ 1.0
1. — 8	−0.0008	−0.0012	− 0.039	−0.049	− 0.76	− 0.80	− 2.9	− 2.6
2. — 8	+0.00351	+0.00421	+ 0.1439	+0.1526	+ 2.454	+ 2.298	+ 8.21	+ 6.88
3. — 8	−0.01305	−0.01304	− 0.4675	−0.4379	− 7.059	− 6.150	− 21.22	− 17.20
4. — 8	+0.03964	+0.03684	+ 1.2781	+1.1597	+ 17.397	+15.318	+ 47.43	+ 40.48
5. — 8	−0.0943	−0.0928	− 2.794	−2.761	− 34.84	−34.51	− 87.1	− 86.6
6. — 8	+0.1578	+0.2013	+ 4.372	+5.683	+ 50.64	+67.19	+117.5	+159.6
7. — 8	−0.1235	−0.3101	− 3.323	−8.400	− 37.30	−95.05	− 84.2	−216.2
8. — 8	−0.0065	+0.2057	− 0.033	+5.732	+ 1.45	+67.08	+ 7.7	+158.3
9. — 8	−0.0115	−0.0130	− 0.228	−0.842	− 1.60	−15.88	− 1.6	− 51.5
10. — 8	+0.0051	+0.0083	+ 0.166	+0.358	+ 1.92	+ 6.20	+ 3.9	+ 20.5
11. — 8	−0.0007	−0.0009	− 0.031	−0.070	− 0.47	− 1.63	− 1.2	− 6.6
12. — 8	+0.0003	+0.0002	+ 0.014	+0.017	+ 0.23	− 0.44	+ 0.6	+ 2.0
13. — 8	−0.0001	0.0000	− 0.003	−0.004	− 0.07	− 0.12	− 0.2	− 0.6
14. — 8	0.0000	0.0000	+ 0.001	+0.001	+ 0.02	+ 0.03	+ 0.1	+ 0.2
— 1. — 9	0.0000	0.0000	+ 0.001	0.000	+ 0.03	− 0.01	+ 0.1	− 0.1
0. — 9	−0.0001	0.0000	− 0.005	+0.002	− 0.10	+ 0.06	− 0.4	+ 0.3
1. — 9	+0.0004	−0.0002	+ 0.016	−0.009	+ 0.30	− 0.21	+ 1.0	− 0.9
2. — 9	−0.0012	+0.0007	− 0.052	+0.036	− 0.88	+ 0.71	− 2.9	+ 2.0
3. — 9	+0.0040	−0.0029	+ 0.154	−0.124	+ 2.44	− 2.16	+ 7.5	− 7.3
4. — 9	−0.0117	+0.0098	− 0.423	+0.369	− 6.30	+ 5.78	− 18.4	+ 17.1
5. — 9	+0.0309	−0.0262	+ 1.058	−0.906	+ 14.90	−12.96	+ 41.3	− 36.5
6. — 9	−0.0718	+0.0537	− 2.338	+1.730	− 31.25	+22.90	− 82.4	+ 59.8
7. — 9	+0.1378	−0.0716	+ 4.281	−2.181	+ 54.49	−27.14	+136.8	− 66.5
8. — 9	−0.1767	+0.0319	− 5.336	+0.965	− 65.93	+11.94	−160.9	+ 29.2
9. — 9	+0.0966	+0.0212	+ 3.062	+0.576	+ 39.91	+ 6.28	+102.8	+ 13.2
10. — 9	−0.0084	+0.0055	− 0.509	+0.077	− 9.91	− 0.27	− 33.6	− 3.6
11. — 9	+0.0049	−0.0019	+ 0.223	−0.059	+ 4.03	− 0.57	+ 13.8	− 0.4
12. — 9	−0.0006	+0.0003	− 0.043	+0.013	− 1.05	+ 0.15	− 4.4	+ 0.1
13. — 9	+0.0002	−0.0002	+ 0.011	−0.007	+ 0.30	− 0.10	+ 1.4	− 0.2
14. — 9	0.0000	0.0000	− 0.003	+0.002	− 0.08	+ 0.03	− 0.4	+ 0.7
15. — 9	0.0000	0.0000	+ 0.001	−0.001	+ 0.02	− 0.01	+ 0.1	0.0
0. — 10	0.0000	0.0000	− 0.000	−0.001	− 0.01	− 0.03	− 0.1	− 0.1
1. — 10	0.0000	+0.0001	+ 0.002	+0.005	+ 0.05	+ 0.11	+ 0.3	+ 0.4
2. — 10	−0.0001	−0.0004	− 0.008	−0.017	− 0.19	− 0.32	− 0.9	− 1.2

ε ε'	$A^{-1/2}$		$A^{-3/2}$		$A^{-5/2}$		$A^{-7/2}$	
	cos	sin	cos	sin	cos	sin	cos	sin
3. — 10	+0.0006	+0.0012	+0.031	+0.052	+ 0.62	+ 0.92	+ 2.4	+ 3.1
4. — 10	−0.0022	−0.0036	−0.099	−0.148	− 1.77	− 2.47	− 6.1	− 8.0
5. — 10	+0.0067	+0.0099	+0.268	+0.387	+ 4.36	+ 6.09	+13.8	+ 18.6
6. — 10	−0.0158	−0.0246	−0.586	−0.910	− 8.80	−13.59	−25.7	− 39.4
7. — 10	+0.0273	+0.0524	+0.950	+1.852	+13.32	+26.37	+36.3	+ 73.0
8. — 10	−0.0265	−0.0886	−0.878	−3.009	−11.65	−41.12	−30.0	−109.2
9. — 10	−0.0019	+0.0959	−0.055	+3.204	− 0.61	+43.04	− 1.2	+112.5
10. — 10	+0.0184	−0.0442	+0.597	−1.579	+ 7.79	−22.77	+19.8	− 63.8
11. — 10	+0.0024	+0.0053	+0.008	+0.305	− 0.96	+ 6.06	− 5.4	+ 21.4
12. — 10	−0.0005	−0.0027	−0.012	−0.134	+ 0.06	− 2.53	+ 1.1	− 9.0
13. — 10	+0.0001	+0.0003	+0.004	+0.026	0.00	+ 0.66	− 0.3	+ 2.8
14. — 10	−0.0001	−0.0001	−0.003	−0.007	− 0.04	− 0.19	0.0	− 0.9
15. — 10	0.0000	0.0000	+0.001	+0.002	+ 0.01	+ 0.05	0.0	+ 0.3
1. — 11	0.0000	0.0000	−0.002	0.000	− 0.04	+ 0.01	− 0.2	+ 0.1
2. — 11	+0.0001	0.0000	+0.005	−0.002	+ 0.11	− 0.05	+ 0.4	− 0.2
3. — 11	−0.0003	+0.0001	−0.017	+0.007	− 0.34	+ 0.16	− 1.3	+ 0.7
4. — 11	+0.0011	−0.0005	+0.050	−0.024	+ 0.93	− 0.50	+ 3.2	− 2.0
5. — 11	−0.0031	+0.0016	−0.136	+0.072	− 2.38	+ 1.34	− 8.0	+ 4.7
6. — 11	+0.0081	−0.0042	+0.337	−0.177	+ 5.58	− 3.00	+17.8	− 9.8
7. — 11	−0.0186	+0.0085	−0.740	+0.336	−11.70	+ 5.30	+35.5	+ 16.0
8. — 11	+0.0362	−0.0117	+1.381	−0.435	+20.90	− 6.42	+60.8	− 18.1
9. — 11	−0.0539	+0.0055	−1.992	+0.190	−29.14	+ 2.59	−81.8	+ 6.7
10. — 11	+0.0499	+0.0110	+1.829	+0.392	+26.60	+ 5.54	+74.3	+ 15.1
11. — 11	−0.0196	−0.0125	−0.786	−0.462	−12.48	− 6.80	−37.9	− 19.2
12. — 11	+0.0032	−0.0008	+0.179	+0.019	+ 3.62	+ 1.08	+13.1	+ 5.4
13. — 11	−0.0015	0.0000	−0.077	−0.007	− 1.53	− 0.29	− 5.6	− 1.7
14. — 11	+0.0002	−0.0001	+0.016	0.000	+ 0.40	+ 0.06	+ 1.8	+ 0.5
15. — 11	−0.0001	0.0000	−0.005	+0.001	− 0.12	+ 0.01	− 0.6	− 0.1
16. — 11	0.0000	0.0000	+0.001	0.000	+ 0.03	0.00	+ 0.2	0.0
2. — 12	0.0000	0.0000	+0.001	+0.001	+ 0.01	+ 0.04	0.0	+ 0.2
3. — 12	0.0000	−0.0001	−0.001	−0.006	− 0.04	− 0.12	− 0.2	− 0.9
4. — 12	+0.0001	+0.0003	+0.005	+0.016	+ 0.13	+ 0.33	+ 0.5	+ 1.3
5. — 12	−0.0003	−0.0009	−0.018	−0.046	− 0.37	− 0.89	− 1.5	− 3.3
6. — 12	+0.0010	+0.0026	+0.047	+0.120	+ 0.91	+ 2.18	+ 3.3	+ 7.6
7. — 12	−0.0023	−0.0063	−0.102	−0.279	− 1.81	− 4.86	− 6.1	− 16.1
8. — 12	+0.0038	+0.0135	+0.161	+0.572	+ 2.64	+ 9.53	+ 8.2	+ 30.1
9. — 12	−0.0033	−0.0238	−0.128	−0.974	− 1.94	−15.63	− 5.6	− 47.1
10. — 12	−0.0028	+0.0312	−0.119	+1.248	− 1.95	+19.50	− 6.1	+ 57.8
11. — 12	+0.0108	−0.0248	+0.423	−0.993	+ 6.50	−15.60	+18.9	− 46.6
12. — 12	−0.0076	+0.0085	−0.316	+0.378	− 5.13	+ 6.57	−15.9	+ 21.5
13. — 12	−0.0002	−0.0019	+0.026	−0.103	+ 0.96	− 2.11	+ 4.6	− 7.9
14. — 12	−0.0001	+0.0008	−0.011	+0.043	− 0.33	+ 0.89	− 1.6	+ 3.3
15. — 12	0.0000	−0.0001	+0.001	−0.009	+ 0.07	− 0.24	+ 0.5	− 1.5
16. — 12	0.0000	0.0000	0.000	+0.003	− 0.01	+ 0.08	− 0.1	+ 0.4
17. — 12	0.0000	0.0000	0.000	0.000	0.00	− 0.02	+ 0.1	− 0.2
18. — 12	0.0000	0.0000	0.000	+0.001	0.00	+ 0.01	0.0	+ 0.1
3. — 13	0.0000	0.0000	+0.002	0.000	+ 0.04	− 0.01	+ 0.2	0.0
4. — 13	−0.0001	0.0000	−0.005	+0.001	− 0.12	+ 0.03	− 0.5	+ 0.1
5. — 13	+0.0003	−0.0001	+0.015	−0.003	+ 0.32	− 0.09	+ 1.3	− 0.4
6. — 13	−0.0008	+0.0002	−0.041	+0.011	− 0.82	+ 0.24	− 3.4	+ 1.0
7. — 13	+0.0020	−0.0005	+0.100	−0.026	+ 1.92	− 0.53	+ 6.9	− 2.0
8. — 13	−0.0047	+0.0010	−0.221	+0.047	− 4.04	+ 0.87	−14.1	+ 3.0
9. — 13	+0.0093	−0.0011	+0.420	−0.048	+ 7.38	− 0.81	+24.3	− 2.6
10. — 13	−0.0149	−0.0006	−0.652	−0.030	−11.08	− 0.59	−35.3	− 2.2
11. — 13	+0.0172	+0.0050	+0.742	+0.218	+12.35	+ 3.66	+38.6	+ 11.6
12. — 13	−0.0118	−0.0081	−0.513	−0.345	− 8.67	− 5.70	−27.6	− 17.8
13. — 13	+0.0035	+0.0044	+0.174	+0.201	+ 3.30	+ 3.57	+11.7	+ 12.0
14. — 13	−0.0011	−0.0001	−0.058	−0.024	− 1.20	− 0.76	− 4.6	− 3.6
15. — 13	+0.0004	+0.0001	+0.023	+0.010	+ 0.50	+ 0.28	+ 2.0	+ 1.3
16. — 13	−0.0001	0.0000	−0.005	−0.001	− 0.14	− 0.06	− 0.6	− 0.4
17. — 13	0.0000	0.0000	+0.002	0.000	+ 0.05	+ 0.01	+ 0.2	+ 0.1

ε ε'	$A^{-1/2}$		$A^{-3/2}$		$A^{-5/2}$		$A^{-7/2}$	
	cos	sin	cos	sin	cos	sin	cos	sin
3. — 14	0.0000	0.0000	0.000	+0.001	0.00	+0.01	0.0	+ 0.1
4. — 14	0.0000	0.0000	0.000	−0.002	0.00	−0.04	− 0.1	− 0.2
5. — 14	0.0000	+0.0001	0.000	+0.005	+0.02	+0.11	0.0	+ 0.5
6. — 14	0.0000	−0.0002	−0.002	−0.014	−0.05	−0.29	− 0.2	− 1.2
7. — 14	+0.0001	+0.0006	+0.005	+0.035	+0.12	+0.72	+ 0.5	+ 2.8
8. — 14	−0.0002	−0.0016	−0.010	−0.081	−0.22	−1.61	0.0	− 6.0
9. — 14	+0.0002	+0.0034	+0.011	+0.167	+0.21	+3.20	+ 0.7	+11.4
10. — 14	+0.0003	−0.0061	+0.015	−0.294	+0.30	−5.43	+ 1.1	−18.7
11. — 14	−0.0020	+0.0089	−0.096	+0.415	−1.77	+7.45	− 6.0	+24.9
12. — 14	+0.0047	−0.0091	+0.215	−0.419	+3.82	−7.41	+12.7	−24.5
13. — 14	−0.0054	+0.0053	−0.247	+0.250	−4.37	+4.54	−14.5	+15.4
14. — 14	+0.0024	−0.0014	+0.121	−0.076	+2.35	−1.57	+ 8.5	− 6.0
15. — 14	−0.0002	+0.0006	−0.019	+0.031	−0.56	+0.66	− 2.7	+ 2.5
16. — 14	+0.0001	−0.0002	+0.008	−0.012	+0.22	−0.27	+ 1.1	− 1.1
17. — 14	0.0000	0.0000	−0.001	+0.003	−0.05	+0.08	− 0.3	+ 0.4
18. — 14	0.0000	0.0000	0.000	−0.001	+0.01	−0.03	0.0	− 0.1
5. — 15	0.0000	0.0000	−0.001	0.000	−0.04	0.00		
6. — 15	+0.0001	0.0000	+0.004	0.000	+0.10	−0.01		
7. — 15	−0.0002	0.0000	−0.012	0.000	−0.26	+0.01		
8. — 15	+0.0005	0.0000	+0.028	−0.001	+0.61	−0.02		
9. — 15	−0.0012	0.0000	−0.063	0.000	−1.30	−0.01		
10. — 15	+0.0023	+0.0002	+0.121	+0.011	+2.42	+0.22		
11. — 15	−0.0039	−0.0008	−0.197	−0.043	−3.81	−0.87		
12. — 15	+0.0050	+0.0022	+0.251	+0.109	+4.75	+2.09		
13. — 15	−0.0045	−0.0035	−0.223	−0.175	−4.18	−3.28		
14. — 15	+0.0022	+0.0033	+0.113	+0.163	+2.21	+3.08		
15. — 15	−0.0005	−0.0013	−0.031	−0.071	−0.69	−1.49		
16. — 15	+0.0003	+0.0001	+0.016	+0.014	+0.34	+0.40		
17. — 15	−0.0001	−0.0001	−0.006	−0.006	−0.14	−0.15		
18. — 15	0.0000	0.0000	+0.002	+0.001	+0.04	+0.04		
19. — 15	0.0000	0.0000	−0.001	0.000	−0.02	−0.01		
6. — 16	0.0000	0.0000	0.000	+0.001	0.00	+0.03		
7. — 16	0.0000	−0.0001	0.000	−0.004	0.00	−0.09		
8. — 16	0.0000	+0.0002	−0.001	+0.010	−0.01	+0.22		
9. — 16	0.0000	−0.0004	+0.002	−0.022	+0.05	−0.50		
10. — 16	−0.0001	+0.0008	−0.007	+0.046	−0.15	+1.00		
11. — 16	+0.0004	−0.0015	+0.021	−0.084	+0.44	−1.75		
12. — 16	−0.0009	+0.0023	−0.051	+0.125	−1.06	+2.54		
13. — 16	+0.0018	−0.0027	+0.097	−0.144	+1.94	−2.86		
14. — 16	−0.0024	+0.0021	−0.127	+0.111	−2.52	+2.20		
15. — 16	+0.0019	−0.0008	+0.101	−0.046	+2.05	−0.97		
16. — 16	−0.0007	+0.0002	−0.041	+0.011	−0.91	+0.27		
17. — 16	+0.0001	−0.0001	+0.009	−0.008	+0.27	−0.17		
18. — 16	0.0000	0.0000	−0.004	+0.003	−0.10	+0.07		
19. — 16	0.0000	0.0000	+0.001	−0.001	+0.03	−0.02		

Um die Koeffizienten in den Reihen für $A^{-n/2}$ zu prüfen, mache ich folgende Entwickelung:

$$A^{-n/2} = 12\beta_0^{(n)} + 24\sum_{i=1} \beta_i^{(n)} \cos(i\varepsilon' - iF)$$

oder

$$A^{-n/2} = 12\beta_0^{(n)} + 24\sum_{i=1} \beta_i^{(n)} (\cos i\varepsilon' \cos iF + \sin i\varepsilon' \sin iF)$$

und wenn wir F für $\varepsilon = 0^0$ mit F_0 bezeichnen, wird die vorige Formel für $\varepsilon = 0^0$

$$A^{-n/2} = 12\beta_0^{(n)} + 24\sum_{i=1} \beta_i^{(n)} \cos iF_0 \,.\, \cos i\varepsilon' + 24\sum_{i=1} \beta_i^{(n)} \sin iF_0 \,.\, \sin i\varepsilon' \ldots \text{(a)}$$

Wir können aber auch die Entwickelung von $A^{-n/2}$ folgendermassen schreiben:

$$A^{-n/2} = \sum_{i=0} \sum_{\nu=0} \left\{ \Sigma_{\nu\,.\,i}^{n\,.\,c} \cos[(i+\nu)\varepsilon - i\varepsilon'] + D_{\nu\,.\,i}^{n\,.\,c} \cos[(i-\nu)\varepsilon - i\varepsilon'] - \right.$$
$$\left. - \Sigma_{\nu\,.\,i}^{n\,.\,s} \sin[(i+\nu)\varepsilon - i\varepsilon'] - D_{\nu\,.\,i}^{n\,.\,s} \sin[(i-\nu)\varepsilon - i\varepsilon'] \right\}$$

wo

$$\Sigma_{\nu\,.\,i}^{n\,.\,c} = C_{\nu\,.\,i}^{n\,.\,c} + S_{\nu\,.\,i}^{n\,.\,s} \qquad \Sigma_{\nu\,.\,i}^{n\,.\,s} = C_{\nu\,.\,i}^{n\,.\,s} - S_{\nu\,.\,i}^{n\,.\,c}$$
$$D_{\nu\,.\,i}^{n\,.\,c} = C_{\nu\,.\,i}^{n\,.\,c} - S_{\nu\,.\,i}^{n\,.\,s} \qquad D_{\nu\,.\,i}^{n\,.\,s} = C_{\nu\,.\,i}^{n\,.\,s} + S_{\nu\,.\,i}^{n\,.\,c}$$

und

$$\Sigma_{0\,.\,0}^{n\,.\,s} = D_{\nu\,.\,0}^{n\,.\,c} = D_{\nu\,.\,0}^{n\,.\,s} = D_{0\,.\,i}^{n\,.\,c} = D_{0\,.\,i}^{n\,.\,s} = 0$$

und $\Sigma_{0\,.\,0}^{n\,.\,c} = C_{0\,.\,0}^{n\,.\,c}$ zwei mal zu gross ist. Setzen wir hier $\varepsilon = 0^0$, bekommt man

$$A^{-n/2} = \sum_{i=0} \sum_{\nu=0} \left\{ \Sigma_{\nu\,.\,i}^{n\,.\,c} \cos i\varepsilon' + D_{\nu\,.\,i}^{n\,.\,c} \cos i\varepsilon' + \Sigma_{\nu\,.\,i}^{n\,.\,s} \sin i\varepsilon' + D_{\nu\,.\,i}^{n\,.\,s} \sin i\varepsilon' \right\}$$

oder

$$A^{-n/2} = \sum_{i=0} \sigma_i^{n\,.\,c} \cos i\varepsilon' + \sum_{i=0} \sigma_i^{n\,.\,s} \sin i\varepsilon' \ldots\ldots \text{(b)}$$

wo

$$\sigma_i^{n\,.\,c} = \sum_{\nu=0} (\Sigma_{\nu\,.\,i}^{n\,.\,c} + D_{\nu\,.\,i}^{n\,.\,c}); \qquad \sigma_i^{n\,.\,s} = \sum_{\nu=0} (\Sigma_{\nu\,.\,i}^{n\,.\,s} + D_{\nu\,.\,i}^{n\,.\,s})$$

Die Gleichungen (a) und (b) sind identisch, also

$$24\beta_i^{(n)} \cos iF_0 \cos i\varepsilon' + 24\beta_i^{(n)} \sin iF_0 \sin i\varepsilon' = \sigma_i^{n\,.\,c} \cos i\varepsilon' + \sigma_i^{n\,.\,s} \sin i\varepsilon'$$

oder

$$24\beta_i^{(n)} \cos(i\varepsilon' - iF_0) = \sigma_i^{n\,.\,c} \cos i\varepsilon' + \sigma_i^{n\,.\,s} \sin i\varepsilon'.$$

Bei dieser Kontrolle ist $\varepsilon' = 10^0$ angenommen, nur nicht för $i = 9$, wo $\varepsilon' = 15^0$ gesetzt ist.

Eine zweite Kontrolle habe ich dadurch bekommen, dass ich für $\varepsilon = 0^0$, $\varepsilon' = 10^0$ teils direkt

$$A^{-n/2} = \frac{1}{12} \cdot \frac{m'}{\sin 1''} \cdot a^{n-1} [D - f \cos(\varepsilon' - F)]^{-n/2}$$

(für $n = 7$ ist der Exponent von a gleich $n - 3$) berechnet habe, teils durch Summirung von

$$A^{-n/2} = \sum_{i=0} \sigma_i^{n \cdot c} \cos i\varepsilon' + \sum_{i=0} \sigma_i^{n \cdot s} \sin i\varepsilon'$$

für $\varepsilon' = 10$; hier ist doch zu bemerken, dass Glieder mit $\cos 9\varepsilon'$ dadurch nicht kontrollirt werden; sie sind doch in der vorigen Spezialkontrolle geprüft. Dagegen entgehen alle Glieder mit $\sin i\varepsilon'$ multiplicirt für $i = 0$ diesen zwei Kontrollen. Sie sind durch folgende Gleichung für $\varepsilon = 15^0$ geprüft:

$$12\beta_0^{(n)} = \sum_{\nu=0} \left\{ \Sigma_{\nu \cdot 0}^{n \cdot c} \cos \nu\varepsilon - \Sigma_{\nu \cdot 0}^{n \cdot s} \sin \nu\varepsilon \right\}$$

Die zweite Kontrolle giebt folgende Werte für $A^{-n/2}$:

	$A^{-1/2}$	$A^{-3/2}$	$A^{-5/2}$
Direkt	+ 99.″8341	+ 94.″707	+ 89.″84
Reihe	+ 99.8341	+ 94.707	+ 89.84

Auf $A^{-7/2}$ habe ich nur Kontrolle eins und drei angewandt.

6.

Der nächste Schritt ist die Entwickelung von $\frac{m'}{\sin 1''} \frac{a}{\Delta}$ und $\frac{a^2 . m'}{\sin 1''} \left(\frac{a}{\Delta}\right)^3$ zu evaluiren.

Wir haben

$$\frac{m'}{\sin 1''} \frac{a}{\Delta} = A^{-1/2} - \frac{1}{4} \cdot \frac{\gamma_2}{a^2} \cdot A^{-3/2} \cos 2\varepsilon' + \frac{3}{64} \cdot \frac{\gamma_2^2}{a^4} \cdot A^{-5/2} (1 + \cos 4\varepsilon') + \text{etc.}$$

$$\frac{a^2 . m'}{\sin 1''} \left(\frac{a}{\Delta}\right)^3 = A^{-3/2} - \frac{3}{4} \cdot \frac{\gamma_2}{a^2} \cdot A^{-5/2} \cos 2\varepsilon' + \frac{15}{64} \cdot \frac{\gamma_2^2}{a^4} \cdot A^{-7/2} (1 + \cos 4\varepsilon') + \text{etc.}$$

Wir schreiben diese Entwickelungen in Reihen folgendermassen:

$$\frac{m'}{\sin 1''} a^{n-1} \left(\frac{a}{\Delta}\right)^n = \frac{1}{2} (0 \,.\, 0 \,.\, c) + \Sigma\Sigma (i \,.\, i' \,.\, c) \cos (i\varepsilon - i'\varepsilon') + \Sigma\Sigma (i \,.\, i' \,.\, s) \sin (i\varepsilon - i'\varepsilon')$$

Die Koeffizienten $(i \,.\, i' \,.\, c)$ und $(i \,.\, i' \,.\, s)$ sind in den folgenden Seiten tabullirt.

ε	ε'	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$ cos	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$ sin	$\frac{a^2 \cdot m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$ cos	$\frac{a^2 \cdot m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$ sin
0.	0	$+\frac{1}{2}$. 220.5635		$+\frac{1}{2}$. 415.468	
1.	0	— 3.39612	+ 1.35286	— 59.6520	+ 23.5405
2.	0	+ 1.03899	+ 0.40298	+ 16.4743	+ 0.5891
3.	0	— 0.1327	— 0.0133	— 3.795	+ 0.262
4.	0	+ 0.0228	+ 0.0110	+ 0.836	+ 0.081
5.	0	— 0.0044	— 0.0018	— 0.200	— 0.027
6.	0	+ 0.0008	+ 0.0004	+ 0.044	+ 0.010
7.	0	— 0.0002	— 0.0001	— 0.010	— 0.003
8.	0	0.0000	0.0000	+ 0.002	+ 0.001
9.	0	0.0000	0.0000	— 0.001	0.000
— 10.	— 1	0.0000	0.0000	+ 0.001	0.000
— 9.	— 1	0.0000	0.0000	0.000	+ 0.001
— 8.	— 1	0.0000	0.0000	— 0.001	— 0.002
— 7.	— 1	0.0000	0.0000	+ 0.002	+ 0.002
— 6.	— 1	— 0.0002	— 0.0002	— 0.007	— 0.014
— 5.	— 1	+ 0.0008	+ 0.0011	+ 0.021	+ 0.061
— 4.	— 1	— 0.0036	— 0.0066	— 0.069	— 0.280
— 3.	— 1	+ 0.0200	+ 0.0344	+ 0.217	+ 1.184
— 2.	— 1	— 0.0531	— 0.2263	— 0.285	— 5.462
— 1.	— 1	+ 0.8505	+ 1.8537	+ 2.191	+ 22.236
0.	— 1	+ 3.1622	— 12.8690	+ 19.861	— 93.973
1.	— 1	+ 12.0196	+ 56.9177	+ 59.540	+ 284.634
2.	— 1	— 0.6424	— 1.2873	— 19.656	— 33.896
3.	— 1	— 0.1466	+ 0.6278	+ 0.766	+ 11.423
4.	— 1	— 0.0031	— 0.0754	— 0.511	— 2.474
5.	— 1	— 0.0051	+ 0.0149	+ 0.003	+ 0.570
6.	— 1	+ 0.0007	— 0.0029	+ 0.002	— 0.136
7.	— 1	— 0.0002	+ 0.0005	— 0.003	+ 0.030
8.	— 1	+ 0.0001	— 0.0001	+ 0.002	— 0.007
9.	— 1	0.0000	0.0000	— 0.001	+ 0.002
10.	— 1	0.0000	0.0000	0.000	— 0.001
11.	— 1	0.0000	0.0000	+ 0.001	+ 0.001
12.	— 1	0.0000	0.0000	— 0.001	0.000
— 7.	— 2	0.0000	0.0000	+ 0.001	— 0.001
— 6.	— 2	— 0.0001	+ 0.0001	— 0.004	+ 0.003
— 5.	— 2	+ 0.0003	— 0.0003	+ 0.019	— 0.010
— 4.	— 2	— 0.0016	+ 0.0013	— 0.084	+ 0.037
— 3.	— 2	+ 0.0095	— 0.0064	+ 0.377	— 0.132
— 2.	— 2	— 0.0525	+ 0.0330	— 1.606	+ 0.412
— 1.	— 2	+ 0.3990	— 0.1263	+ 7.227	— 1.121
0.	— 2	— 2.0564	+ 0.3903	— 26.281	+ 2.276
1.	— 2	+ 9.7044	+ 0.3469	+ 92.989	+ 1.191
2.	— 2	— 20.5566	+ 9.0570	— 165.712	+ 72.153
3.	— 2	+ 0.5632	— 0.3073	+ 18.262	— 14.154
4.	— 2	— 0.3667	— 0.0227	— 7.480	+ 1.482
5.	— 2	+ 0.0415	— 0.0077	+ 1.528	— 0.545
6.	— 2	— 0.0095	— 0.0021	— 0.375	+ 0.043
7.	— 2	+ 0.0018	+ 0.0002	+ 0.090	— 0.010
8.	— 2	— 0.0003	— 0.0001	— 0.020	0.000
9.	— 2	+ 0.0001	0.0000	+ 0.005	0.000
10.	— 2	0.0000	0.0000	— 0.001	0.000
— 6.	— 3	0.0000	0.0000	+ 0.001	+ 0.001
— 5.	— 3	— 0.0001	— 0.0001	— 0.004	— 0.006
— 4.	— 3	+ 0.0005	+ 0.0004	+ 0.016	+ 0.025
— 3.	— 3	— 0.0021	— 0.0023	— 0.059	— 0.110
— 2.	— 3	+ 0.0103	+ 0.0135	+ 0.210	+ 0.484
— 1.	— 3	— 0.0407	— 0.0792	— 0.631	— 2.044
0.	— 3	+ 0.13938	+ 0.44435	+ 1.82360	+ 8.16515

$\varepsilon \quad \varepsilon'$	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$		$\frac{a^2 \cdot m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$	
	cos	sin	cos	sin
1. — 3	— 0.32002	— 1.79103	— 3.91310	— 26.43148
2. — 3	+ 1.03171	+ 5.98557	+ 13.95234	+ 73.23710
3. — 3	— 5.5660	— 7.7947	— 61.376	— 87.295
4. — 3	+ 0.1538	+ 0.2744	+ 9.440	+ 9.546
5. — 3	— 0.0243	— 0.2048	— 1.645	— 4.637
6. — 3	+ 0.0074	+ 0.0223	+ 0.474	+ 0.901
7. — 3	+ 0.0005	— 0.0059	— 0.058	— 0.238
8. — 3	0.0000	+ 0.0011	+ 0.014	+ 0.057
9. — 3	0.0000	— 0.0002	— 0.002	— 0.013
10. — 3	0.0000	0.0000	0.000	+ 0.003
11. — 3	0.0000	0.0000	0.000	— 0.001
— 5. — 4	0.0000	0.0000	— 0.002	+ 0.002
— 4. — 4	+ 0.0001	— 0.0001	+ 0.007	— 0.006
— 3. — 4	— 0.0005	+ 0.0007	— 0.031	+ 0.024
— 2. — 4	+ 0.0031	— 0.0031	+ 0.138	— 0.085
— 1. — 4	— 0.0178	+ 0.0130	— 0.584	+ 0.288
0. — 4	+ 0.0925	— 0.0447	+ 2.320	— 0.852
1. — 4	— 0.4045	+ 0.1419	— 8.099	+ 2.449
2. — 4	+ 1.3483	— 0.3678	+ 23.064	— 6.155
3. — 4	— 3.3179	+ 1.3131	— 49.842	+ 20.521
4. — 4	+ 2.9088	— 3.1357	+ 42.110	— 44.427
5. — 4	— 0.1441	+ 0.0839	— 4.891	+ 6.041
6. — 4	+ 0.1092	— 0 0341	+ 2.722	— 1.478
7. — 4	— 0.0117	+ 0.0057	— 0.508	+ 0.367
8. — 4	+ 0.0035	— 0.0002	+ 0.148	— 0.057
9. — 4	— 0.0006	+ 0.0001	— 0.035	+ 0.014
10. — 4	+ 0.0001	0.0000	+ 0.008	— 0.002
11. — 4	0.0000	0.0000	— 0.002	0.000
— 5. — 5	0.0000	0.0000	+ 0.001	0.000
— 4. — 5	0.0000	0.0000	— 0.002	— 0.002
— 3. — 5	+ 0.0002	+ 0.0001	+ 0.009	+ 0.008
— 2. — 5	— 0.0009	— 0.0007	— 0.032	— 0.038
— 1. — 5	+ 0.0038	+ 0.0040	+ 0.112	+ 0.162
0. — 5	— 0.0144	— 0.0202	— 0.359	— 0.647
1. — 5	+ 0.04675	+ 0.09026	+ 1.05013	+ 2.34884
2. — 5	— 0.14122	— 0.32560	— 2.94222	— 7.21260
3. — 5	+ 0.38597	+ 0.90873	+ 7.65738	+ 17.84562
4. — 5	— 1.1145	— 1.6928	— 20.410	— 30.288
5. — 5	+ 1.6748	+ 1.0221	+ 29.160	+ 18.384
6. — 5	— 0.0503	— 0.0784	— 3.784	— 2.458
7. — 5	+ 0.0296	+ 0.0554	+ 1.173	+ 1.508
8. — 5	— 0.0040	— 0.0060	— 0.265	— 0.274
9. — 5	+ 0.0004	+ 0.0020	+ 0.048	+ 0.088
10. — 5	— 0.0001	— 0.0004	— 0.012	— 0.021
11. — 5	0.0000	+ 0.0001	+ 0.002	+ 0.005
12. — 5	0.0000	0.0000	0.000	— 0.001
— 4. — 6	0.0000	0.0000	— 0.001	+ 0.001
— 3. — 6	0.0000	— 0.0001	+ 0.002	— 0.003
— 2. — 6	— 0.0002	+ 0.0003	— 0.010	+ 0.011
— 1. — 6	+ 0.0009	— 0.0011	+ 0.043	— 0.041
0. — 6	— 0.0045	+ 0.0043	— 0.177	+ 0.135
1. — 6	+ 0.0202	— 0.0150	+ 0.657	— 0.417
2. — 6	— 0.0777	+ 0.0465	— 2.152	+ 1.193
3. — 6	+ 0.2383	— 0.1338	+ 5.841	— 3.209
4. — 6	— 0.5577	+ 0.3500	— 12.426	+ 7.925
5. — 6	+ 0.7961	— 0.7980	+ 16.585	— 16.891
6. — 6	— 0.3154	+ 0.8602	— 6.931	+ 17.870
7. — 6	+ 0.0428	— 0.0323	+ 1.199	— 2.345
8. — 6	— 0.0267	+ 0.0216	— 0.783	+ 0.855

ε ε'	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$		$\frac{a^2 \cdot m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$	
	cos	sin	cos	sin
9. — 6	+ 0.0030	— 0.0026	+ 0.141	— 0.181
10. — 6	— 0.0011	+ 0.0005	— 0.050	+ 0.038
11. — 6	+ 0.0002	— 0.0001	+ 0.012	— 0.009
12. — 6	0.0000	0.0000	— 0.003	+ 0.002
13. — 6	0.0000	0.0000	+ 0.001	0.000
— 3. — 7	0.0000	0.0000	— 0.001	— 0.001
— 2. — 7	+ 0.0001	0.0000	+ 0.004	+ 0.003
— 1. — 7	— 0.0003	— 0.0002	— 0.014	— 0.011
0. — 7	+ 0.0013	+ 0.0010	+ 0.048	+ 0.047
1. — 7	— 0.0046	— 0.0045	— 0.154	— 0.178
2. — 7	+ 0.0148	+ 0.0181	+ 0.455	+ 0.611
3. — 7	— 0.0439	— 0.0605	— 1.257	— 1.802
4. — 7	+ 0.1185	+ 0.1603	+ 3.187	+ 4.327
5. — 7	— 0.2818	— 0.3133	— 7.163	— 7.831
6. — 7	+ 0.5165	+ 0.3392	+ 12.459	+ 8.089
7. — 7	— 0.4279	— 0.0685	— 10.388	— 1.907
8. — 7	+ 0.0213	+ 0.0227	+ 1.444	+ 0.554
9. — 7	— 0.0142	— 0.0120	— 0.584	— 0.375
10. — 7	+ 0.0017	+ 0.0015	+ 0.119	+ 0.069
11. — 7	— 0.0004	— 0.0006	— 0.028	— 0.027
12. — 7	+ 0.0001	+ 0.0001	+ 0.007	+ 0.006
13. — 7	0.0000	0.0000	— 0.001	— 0.002
— 2. — 8	0.0000	0.0000	+ 0.001	— 0.001
— 1. — 8	0.0000	+ 0.0001	— 0.003	+ 0.005
0. — 8	+ 0.0002	— 0.0004	+ 0.012	— 0.016
1. — 8	— 0.0010	+ 0.0014	— 0.047	+ 0.054
2. — 8	+ 0.00412	— 0.00456	+ 0.16670	— 0.16458
3. — 8	— 0.01473	+ 0.01398	— 0.52332	+ 0.46837
4. — 8	+ 0.04329	— 0.03918	+ 1.38745	— 1.23147
5. — 8	— 0.0992	+ 0.0978	— 2.933	+ 2.906
6. — 8	+ 0.1600	— 0.2068	+ 4.440	— 5.841
7. — 8	— 0.1242	+ 0.3114	— 3.347	+ 8.358
8. — 8	— 0.0060	— 0.2069	— 0.015	— 5.781
9. — 8	— 0.0115	+ 0.0140	— 0.230	+ 0.884
10. — 8	+ 0.0049	— 0.0087	+ 0.159	— 0.379
11. — 8	— 0.0007	+ 0.0010	— 0.031	+ 0.075
12. — 8	+ 0.0003	— 0.0003	+ 0.014	— 0.019
13. — 8	— 0.0001	+ 0.0001	— 0.003	+ 0.005
14. — 8	0.0000	0.0000	+ 0.001	— 0.001
— 1. — 9	0.0000	0.0000	+ 0.001	+ 0.001
0. — 9	— 0.0001	0.0000	— 0.005	— 0.003
1. — 9	+ 0.0004	+ 0.0002	+ 0.018	+ 0.012
2. — 9	— 0.0014	— 0.0009	— 0.057	— 0.043
3. — 9	+ 0.0043	+ 0.0034	+ 0.168	+ 0.144
4. — 9	— 0.0126	— 0.0110	— 0.455	— 0.413
5. — 9	+ 0.0330	+ 0.0285	+ 1.129	+ 0.981
6. — 9	— 0.0756	— 0.0561	— 2.456	— 1.805
7. — 9	+ 0.1410	+ 0.0723	+ 4.387	+ 2.206
8. — 9	— 0.1775	— 0.0322	— 5.377	— 0.976
9. — 9	+ 0.0974	— 0.0210	+ 3.097	— 0.570
10. — 9	— 0.0090	— 0.0054	— 0.535	— 0.073
11. — 9	+ 0.0051	+ 0.0017	+ 0.235	+ 0.054
12. — 9	— 0.0007	— 0.0003	— 0.047	— 0.012
13. — 9	+ 0.0002	+ 0.0002	+ 0.013	+ 0.007
14. — 9	0.0000	0.0000	— 0.003	— 0.002
15. — 9	0.0000	0.0000	+ 0.001	+ 0.001
0. — 10	0.0000	0.0000	— 0.001	+ 0.002
1. — 10	0.0000	— 0.0001	+ 0.003	— 0.006

$\varepsilon \quad \varepsilon'$	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$		$\frac{a^2 \cdot m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$	
	cos	sin	cos	sin
2. — 10	— 0.0002	+ 0.0004	— 0.011	+ 0.019
3. — 10	+ 0.0008	— 0.0013	+ 0.038	— 0.058
4. — 10	— 0.0026	+ 0.0039	— 0.115	+ 0.162
5. — 10	+ 0.0075	— 0.0108	+ 0.300	— 0.419
6. — 10	— 0.0171	+ 0.0263	— 0.632	+ 0.972
7. — 10	+ 0.0283	— 0.0550	+ 0.985	— 1.940
8. — 10	— 0.0266	+ 0.0904	— 0.882	+ 3.077
9. — 10	— 0.0018	— 0.0965	— 0.052	— 3.233
10. — 10	+ 0.0184	+ 0.0447	+ 0.597	+ 1.602
11. — 10	+ 0.0023	— 0.0056	+ 0.003	— 0.320
12. — 10	— 0.0004	+ 0.0029	— 0.007	+ 0.140
13. — 10	+ 0.0001	— 0.0004	+ 0.003	— 0.028
14. — 10	— 0.0001	+ 0.0001	— 0.003	+ 0.008
15. — 10	0.0000	0.0000	+ 0.001	— 0.002
1. — 11	0.0000	0.0000	— 0.002	— 0.001
2. — 11	+ 0.0001	0.0000	+ 0.006	+ 0.002
3. — 11	— 0.0004	— 0.0002	— 0.019	— 0.009
4. — 11	+ 0.0012	+ 0.0006	+ 0.056	+ 0.030
5. — 11	— 0.0034	— 0.0018	— 0.150	— 0.084
6. — 11	+ 0.0088	+ 0.0047	+ 0.366	+ 0.198
7. — 11	— 0.0199	— 0.0092	— 0.791	— 0.361
8. — 11	+ 0.0378	+ 0.0120	+ 1.443	+ 0.446
9. — 11	— 0.0550	— 0.0053	— 2.034	— 0.185
10. — 11	+ 0.0502	— 0.0109	+ 1.848	— 0.393
11. — 11	— 0.0199	+ 0.0125	— 0.801	+ 0.465
12. — 11	+ 0.0034	+ 0.0742	+ 0.188	— 0.024
13. — 11	— 0.0015	+ 0.0001	— 0.080	+ 0.010
14. — 11	+ 0.0002	0.0000	+ 0.017	— 0.001
15. — 11	— 0.0001	0.0000	— 0.005	— 0.001
16. — 11	0.0000	0.0000	+ 0.001	0.000
2. — 12	0.0000	0.0000	+ 0.001	— 0.002
3. — 12	0.0000	+ 0.0001	— 0.002	+ 0.007
4. — 12	+ 0.0001	— 0.0004	+ 0.007	— 0.019
5. — 12	— 0.0004	+ 0.0011	— 0.022	+ 0.052
6. — 12	+ 0.0012	— 0.0028	+ 0.055	— 0.133
7. — 12	— 0.0026	+ 0.0069	— 0.114	+ 0.304
8. — 12	+ 0.0041	— 0.0144	+ 0.171	— 0.610
9. — 12	— 0.0033	+ 0.0248	— 0.128	+ 1.016
10. — 12	— 0.0031	— 0.0318	— 0.126	— 1.273
11. — 12	+ 0.0108	+ 0.0250	+ 0.426	+ 1.006
12. — 12	— 0.0077	— 0.0086	— 0.319	— 0.387
13. — 12	— 0.0001	+ 0.0020	+ 0.030	+ 0.108
14. — 12	— 0.0002	— 0.0008	— 0.013	— 0.044
15. — 12	0.0000	+ 0.0001	+ 0.002	+ 0.010
16. — 12	0.0000	— 0.0001	0.000	— 0.003
17. — 12	0.0000	0.0000	0.000	+ 0.001
18. — 12	0.0000	0.0000	0.000	— 0.001
3. — 13	0.0000	0.0000	+ 0.002	0.000
4. — 13	— 0.0001	0.0000	— 0.006	— 0.001
5. — 13	+ 0.0003	+ 0.0001	+ 0.017	+ 0.005
6. — 13	— 0.0009	— 0.0002	— 0.046	— 0.014
7. — 13	+ 0.0023	+ 0.0006	+ 0.111	+ 0.031
8. — 13	— 0.0051	— 0.0011	— 0.241	— 0.053
9. — 13	+ 0.0099	+ 0.0012	+ 0.448	+ 0.051
10. — 13	— 0.0155	+ 0.0007	— 0.678	+ 0.035
11. — 13	+ 0.0175	— 0.0052	+ 0.757	— 0.224
12. — 13	— 0.0119	+ 0.0081	— 0.521	+ 0.348
13. — 13	+ 0.0036	— 0.0044	+ 0.179	— 0.204
14. — 13	— 0.0011	+ 0.0001	— 0.060	+ 0.027

ε ε'	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$		$\frac{a^2 . m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$	
	cos	sin	cos	sin
15. — 13	+ 0.0004	— 0.0002	+ 0.024	— 0.012
16. — 13	— 0.0001	0.0000	— 0.006	+ 0.002
17. — 13	0.0000	0.0000	+ 0.002	0.000
3. — 14	0.0000	0.0000	0.000	— 0.001
4. — 14	0.0000	0.0000	0.000	+ 0.002
5. — 14	0.0000	— 0.0001	+ 0.001	— 0.006
6. — 14	0.0000	+ 0.0003	— 0.003	+ 0.016
7. — 14	+ 0.0001	— 0.0007	+ 0.007	— 0.039
8. — 14	— 0.0002	+ 0.0017	— 0.013	+ 0.090
9. — 14	+ 0.0003	— 0.0037	+ 0.013	— 0.182
10. — 14	+ 0.0003	+ 0.0065	+ 0.016	+ 0.313
11. — 14	— 0.0021	— 0.0092	— 0.102	— 0.430
12. — 14	+ 0.0048	+ 0.0092	+ 0.221	+ 0.427
13. — 14	— 0.0054	— 0.0054	— 0.249	— 0.254
14. — 14	+ 0.0024	+ 0.0014	+ 0.124	+ 0.079
15. — 14	— 0.0002	— 0.0006	— 0.021	— 0.033
16. — 14	+ 0.0002	+ 0.0002	+ 0.009	+ 0.012
17. — 14	0.0000	0.0000	— 0.002	— 0.003
18. — 14	0.0000	0.0000	0.000	+ 0.001
5. — 15	0.0000	0.0000	— 0.002	0.000
6. — 15	+ 0.0001	0.0000	+ 0.005	0.000
7. — 15	— 0.0002	0.0000	— 0.013	— 0.001
8. — 15	+ 0.0006	0.0000	+ 0.032	+ 0.002
9. — 15	— 0.0013	0.0000	— 0.069	0.000
10. — 15	+ 0.0025	— 0.0002	+ 0.131	— 0.011
11. — 15	— 0.0041	+ 0.0009	— 0.208	+ 0.047
12. — 15	+ 0.0052	— 0.0023	+ 0.259	— 0.114
13. — 15	— 0.0046	+ 0.0036	— 0.226	+ 0.178
14. — 15	+ 0.0022	— 0.0033	+ 0.114	— 0.164
15. — 15	— 0.0005	+ 0.0013	— 0.031	+ 0.071
16. — 15	+ 0.0003	— 0.0001	+ 0.017	— 0.014
17. — 15	— 0.0001	+ 0.0001	— 0.006	+ 0.006
18. — 15	0.0000	0.0000	+ 0.002	— 0.001
19. — 15	0.0000	0.0000	— 0.001	0.000
6. — 16	0.0000	0.0000	0.000	— 0.002
7. — 16	0.0000	+ 0.0001	0.000	+ 0.004
8. — 16	0.0000	— 0.0002	— 0.001	— 0.011
9. — 16	0.0000	+ 0.0004	+ 0.002	+ 0.025
10. — 16	— 0.0001	— 0.0009	— 0.007	— 0.051
11. — 16	+ 0.0004	+ 0.0016	+ 0.022	+ 0.090
12. — 16	— 0.0010	— 0.0025	— 0.055	— 0.132
13. — 16	+ 0.0019	+ 0.0028	+ 0.101	+ 0.148
14. — 16	— 0.0025	— 0.0021	— 0.129	— 0.112
15. — 16	+ 0.0019	+ 0.0008	+ 0.102	+ 0.047
16. — 16	— 0.0007	— 0.0001	— 0.041	— 0.011
17. — 16	+ 0.0001	+ 0.0002	+ 0.009	+ 0.008
18. — 16	0.0000	0.0000	— 0.004	— 0.003
19. — 16	0.0000	0.0000	+ 0.001	+ 0.001

Um die Koeffizienten $(i\,.\,i'\,.\,{c \atop s})$ zu kontrolliren habe ich $\varepsilon = 0^0$ gesetzt und bekomme dann

$$\mu a^{n-1}\left[D - f\cos(\varepsilon' - F_0) + \frac{1}{2}\gamma_2\cos 2\varepsilon'\right]^{-n/2} = \sum_{i'}\left\{\sum_{i}(i\,.\,i'\,.\,c)\cos i'\varepsilon' + \sum_{i}(i\,.\,i'\,.\,s)\sin i'\varepsilon'\right\}$$

Ich habe also zuerst die Summen $\sum_i(i\,.\,i'.\,c)$ und $\sum_i(i\,.\,i'.\,s)$ und darauf sowohl die linke wie die rechte Seite unter Annahme von $\varepsilon' = 10^0$ berechnet.

	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$	$\frac{a^2\,.\,m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$
Direkt	$+ 99''.7817$	$+ 94''.558$
Reihe	$+ 99.7816$	$+ 94.557$

Dadurch werden doch keine der Koeffizienten $(i\,.\,0\,.\,s)$ oder $(i\,.\,9\,.\,c)$ kontrollirt. Wir setzen daher $\varepsilon' = 0^0$ und bekommen

$$\frac{m'}{\sin 1''}a^{n-1}[D - f\cos F + \tfrac{1}{2}\gamma_2]^{-n/2} = \sum_i \Big\{ \sum_{i'}(i\,.\,i'.\,c)\cos i\varepsilon + \sum_{i'}(i\,.\,i'.\,s)\sin i\varepsilon \Big\}$$

Die Summen $\sum_{i'}(i\,.\,i'.\,c)$ und $\sum_{i'}(i\,.\,i'\,.\,s)$ werden zuerst evaluirt, wonach die linke so wie die rechte Seite für $\varepsilon = 15^0$ berechnet wurde. Die Rechnung gab:

	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$	$\frac{a^2\,.\,m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$
Direkt	$+ 124''.3358$	$+ 182''.951$
Reihe	$+ 124.3354$	$+ 182.949$

7.

Die vorigen Entwickelungen von $\frac{m'}{\sin 1''}\frac{a}{\Delta}$ und $\frac{a^2\,.\,m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$ waren von der Form

$$\frac{m'}{\sin 1''}a^{n-1}\left(\frac{a}{\Delta}\right)^n = \Sigma\Sigma(i\,.\,i'.\,c)\cos(i\varepsilon - i'\varepsilon') + \Sigma\Sigma(i\,.\,i'.\,s)\sin(i\varepsilon - i'\varepsilon')$$

Wir wollen sie jetzt in der folgenden Form schreiben:

$$\frac{m'}{\sin 1''}a^{n-1}\left(\frac{a}{\Delta}\right) = \Sigma\Sigma((i\,.\,i'.\,c))\cos(i\varepsilon - i'g') + \Sigma\Sigma((i\,.\,i'.\,s))\sin(i\varepsilon - i'g')$$

wo g' die mittlere Anomalie des störenden Körpers ist.

Folgende Relation existirt zwischen den Koeffizienten beider Entwickelungen:

$$((i\,.\,i'\,.\,c)) = (i\,.\,i'\,.\,c)\,P_{-i'}^{(-i')} + (i\,.\,i'+1\,.\,c)\,P_{-i'}^{(-i'-1)} + (i\,.\,i'+2\,.\,c)\,P_{-i'}^{(-i'-2)} + \ldots.$$
$$+ (i\,.\,i'-1\,.\,c)\,P_{-i'}^{(-i'+1)} + (i\,.\,i'-2\,.\,c)\,P_{-i'}^{(-i'+2)} + \ldots.$$
$$((i\,.\,i'\,.\,s)) = (i\,.\,i'\,.\,s)\,P_{-i'}^{(-i')} + (i\,.\,i'+1\,.\,s)\,P_{-i'}^{(-i'-1)} + (i\,.\,i'+2\,.\,s)\,P_{-i'}^{(-i'-2)} + \ldots.$$
$$+ (i\,.\,i'-1\,.\,s)\,P_{-i'}^{(-i'+1)} + (i\,.\,i'-2\,.\,s)\,P_{-i'}^{(-i'+2)} + \ldots.$$

wo $$P_k^{(i')} = \frac{i'}{k}\,.\,I_{k\lambda'}^{(k-i')}$$

also $$P_{-i}^{(-i+q)} = \left(1 - \frac{q}{i}\right) I_{l_i}^{(q)} \qquad P_{-i}^{(-i-q)} = (-1)^q\,.\left(1 + \frac{q}{i}\right) I_{l_i}^{(q)}$$

Die I werden folgendermassen bestimmt:

$$I_{l_i}^{(m)} = I_{l_i}^{(0)}\,.\,p_1^{(i)}\,.\,p_2^{(i)}\,.\,\ldots\,.\,p_m^{(i)}$$

wo $$\frac{1}{p_m^{(i)}} = \frac{m}{l_i} - p_{m+1}^{(i)} \qquad l_i = i\lambda' = i\,.\,\frac{1}{2}e'$$

$$I_{l_i}^{(0)} = 1 - \frac{l_i^2}{1^2} + \frac{l_i^4}{1^2\,.\,2^2} - \frac{l_i^6}{1^2\,.\,2^2\,.\,3^2} + \ldots$$

Als Kontrolle dienen die Gleichungen:

$$I_{l_i}^{(m)} = \frac{l_i^m}{\underline{m}}\left\{1 - \frac{l_i^2}{1\,.\,(m+1)} + \frac{l_i^4}{1\,.\,2\,.\,(m+1)\,(m+2)} - \right.$$
$$\left. - \frac{l_i^6}{1\,.\,2\,.\,3\,.\,(m+1)\,(m+2)\,(m+3)} + \text{etc.}\right\}$$

$$\sum_{k=-\infty}^{k=+\infty} P_k^{(i)} = 1$$

Zu bemerken ist, dass

$$P_0^{(0)} = 1; \quad P_0^{(1)} = -\lambda'; \quad P_0^{(i)} = 0 \text{ für } i \geqq 2.$$

i	$\log I_{i\lambda'}^{(0)}$	$\log I_{i\lambda'}^{(1)}$	$\log I_{i\lambda'}^{(2)}$	$\log I_{i\lambda'}^{(3)}$	$\log I_{i\lambda'}^{(4)}$	$\log I_{i\lambda'}^{(5)}$
1	9.999745	8.384714	6.469	4.4		
2	9.998977	8.685361	7.0704	5.28		
3	9.9976970	8.860812	7.42213	5.807		
4	9.9959016	8.984856	7.67141	6.182	4.6	
5	9.9935876	9.080614	7.86446	6.472	4.95	
6	9.990751	9.158386	8.0219	6.709	5.27	
7	9.987387	9.223665	8.1547	6.909	5.54	
8	9.983490	9.279731	8.2694	7.0816	5.768	4.36
9	9.979049	9.32869	8.3702	7.234	5.97	4.61
10	9.97406	9.37200	8.4601	7.370	6.15	4.8
11	9.96851	9.4107	8.5411	7.493	6.32	5.0
12	9.96239	9.4455	8.6147	7.605	6.47	5.2
13	9.95569	9.4770	8.682	7.707	6.61	5.4
14	9.9484	9.5057	8.744	7.802	6.73	5.6
15	9.9405	9.5319	8.802	7.89	6.85	5.7
	9.932	9.556	8.855	7.97	7.0	5.9

ε g'	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$		$\frac{a^2 . m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$	
	cos	sin	cos	sin
0. — 0	$+\frac{1}{2}$. 220.4101		$+\frac{1}{2}$. 414.504	
1. — 0	— 3.70831	+ 0.01716	— 61.1494	+ 17.1754
2. — 0	+ 1.05586	+ 0.42871	+ 16.9581	+ 1.2788
3. — 0	— 0.1296	— 0.0277	— 3.819	+ 0.014
4. — 0	+ 0.0230	+ 0.0126	+ 0.851	+ 0.134
5. — 0	— 0.0043	— 0.0022	— 0.200	— 0.040
6. — 0	+ 0.0008	+ 0.0005	+ 0.044	+ 0.013
7. — 0	— 0.0002	— 0.0001	— 0.010	— 0.004
8. — 0	0.0000	0.0000	+ 0.002	+ 0.001
9. — 0	0.0000	0.0000	— 0.001	0.000
— 10. — 1	0.0000	0.0000	+ 0.001	0.000
— 9. — 1	0.0000	0.0000	0.000	+ 0.001
— 8. — 1	0.0000	0.0000	— 0.001	— 0.002
— 7. — 1	0.0000	0.0000	+ 0.002	+ 0.002
— 6. — 1	— 0.0002	— 0.0002	— 0.006	— 0.014
— 5. — 1	+ 0.0008	+ 0.0011	+ 0.020	+ 0.062
— 4. — 1	— 0.0035	— 0.0067	— 0.065	— 0.283
— 3. — 1	+ 0.0195	+ 0.0351	+ 0.198	+ 1.193
— 2. — 1	— 0.0502	— 0.2283	— 0.201	— 5.488
— 1. — 1	+ 0.8270	+ 1.8755	+ 1.821	+ 22.360
0. — 1	+ 3.2593	— 12.8837	— 21.120	— 94.049
1. — 1	+ 11.5413	+ 56.8665	+ 54.991	+284.392
2. — 1	+ 0.3559	— 1.7207	— 11.595	— 37.312
3. — 1	— 0.1787	+ 0.6354	— 0.174	+ 12.026
4. — 1	+ 0.0148	— 0.0741	— 0.140	— 2.536
5. — 1	— 0.0072	+ 0.0151	— 0.073	+ 0.592
6. — 1	+ 0.0011	— 0.0028	+ 0.020	— 0.138
7. — 1	— 0.0003	+ 0.0005	— 0.008	+ 0.030
8. — 1	+ 0.0001	— 0.0001	+ 0.003	— 0.007
9. — 1	0.0000	0.0000	— 0.001	+ 0.002
10. — 1	0.0000	0.0000	0.000	— 0.001
11. — 1	0.0000	0.0000	+ 0.001	+ 0.001
12. — 1	0.0000	0.0000	— 0.001	0.000
— 7. — 2	0.0000	0.0000	+ 0.001	0.000
— 6. — 2	— 0.0001	+ 0.0001	— 0.005	+ 0.002
— 5. — 2	+ 0.0003	— 0.0003	+ 0.020	— 0.008
— 4. — 2	— 0.0017	+ 0.0011	— 0.087	+ 0.028
— 3. — 2	+ 0.0103	— 0.0055	+ 0.386	— 0.095
— 2. — 2	— 0.0545	+ 0.0265	— 1.624	+ 0.243
— 1. — 2	+ 0.4217	— 0.0753	+ 7.307	— 0.428
0. — 2	— 1.9848	+ 0.0453	— 25.865	— 0.603
1. — 2	+ 9.9951	+ 1.8552	+ 94.478	+ 10.011
2. — 2	— 20.5957	+ 8.5686	— 166.758	+ 65.824
3. — 2	+ 0.9553	+ 0.2783	+ 22.581	— 7.452
4. — 2	— 0.3703	— 0.0518	— 8.061	+ 0.621
5. — 2	+ 0.0427	+ 0.0076	+ 1.632	— 0.180
6. — 2	— 0.0098	— 0.0039	— 0.402	— 0.029
7. — 2	+ 0.0018	+ 0.0006	+ 0.093	+ 0.009
8. — 2	— 0.0003	— 0.0002	— 0.021	— 0.004
9. — 2	+ 0.0001	0.0000	+ 0.005	+ 0.001
10. — 2	0.0000	0.0000	— 0.001	— 0.001
11. — 2	0.0000	0.0000	+ 0.001	0.000
— 6. — 3	0.0000	0.0000	+ 0.001	+ 0.001
— 5. — 3	— 0.0001	— 0.0001	— 0.003	— 0.006
— 4. — 3	+ 0.0004	+ 0.0005	+ 0.011	+ 0.027
— 3. — 3	— 0.0015	— 0.0027	— 0.037	— 0.118
— 2. — 3	+ 0.0073	+ 0.0151	+ 0.118	+ 0.505
— 1. — 3	+ 0.0031	— 0.0847	— 0.219	— 2.095

ε g'	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$		$\frac{a^2.m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$	
	cos	sin	cos	sin
0. — 3	+ 0.03292	+ 0.45379	+ 0.3338	+ 8.2289
1. — 3	+ 0.20116	— 1.72796	+ 1.4477	— 26.2098
2. — 3	— 0.10005	+ 6.42516	+ 3.5985	+ 76.8748
3. — 3	— 5.1867	— 7.8910	— 55.311	— 89.414
4. — 3	— 0.1510	+ 0.5678	+ 4.864	+ 13.730
5. — 3	— 0.0032	— 0.2076	— 0.963	— 5.140
6. — 3	— 0.0038	+ 0.0250	+ 0.174	+ 1.028
7. — 3	+ 0.0018	— 0.0061	+ 0.001	— 0.266
8. — 3	— 0.0003	+ 0.0011	— 0.002	+ 0.061
9. — 3	+ 0.0001	— 0.0002	+ 0.002	— 0.014
10. — 3	0.0000	0.0000	— 0.001	+ 0.003
11. — 3	0.0000	0.0000	0.000	— 0.001
— 6. — 4	0.0000	0.0000	+ 0.001	0.000
— 5. — 4	0.0000	0.0000	— 0.002	+ 0.001
— 4. — 4	+ 0.0001	— 0.0001	+ 0.008	— 0.004
— 3. — 4	— 0.0007	+ 0.0004	— 0.035	+ 0.014
— 2. — 4	+ 0.0039	— 0.0019	+ 0.152	— 0.044
— 1. — 4	— 0.0202	+ 0.0064	— 0.620	+ 0.116
0. — 4	+ 0.0988	— 0.0093	+ 2.411	— 0.172
1. — 4	— 0.4059	+ 0.0029	— 8.208	+ 0.239
2. — 4	+ 1.3786	+ 0.1299	+ 23.808	+ 0.255
3. — 4	— 3.7336	+ 0.6247	— 54.660	+ 11.796
4. — 4	+ 3.0225	— 2.8796	+ 44.756	— 39.603
5. — 4	— 0.3421	— 0.0605	— 8.363	+ 3.311
6. — 4	+ 0.1124	— 0.0167	+ 3.135	— 0.978
7. — 4	— 0.0147	— 0.0016	— 0.638	+ 0.149
8. — 4	+ 0.0037	+ 0.0009	+ 0.173	— 0.013
9. — 4	— 0.0007	— 0.0002	— 0.039	+ 0.001
10. — 4	+ 0.0001	+ 0.0001	+ 0.009	+ 0.001
11. — 4	0.0000	0.0000	— 0.002	0.000
12. — 4	0.0000	0.0000	+ 0.001	0.000
— 5. — 5	0.0000	0.0000	0.000	+ 0.001
— 4. — 5	0.0000	0.0000	— 0.001	— 0.002
— 3. — 5	+ 0.0001	+ 0.0002	+ 0.005	+ 0.010
— 2. — 5	— 0.0004	— 0.0009	— 0.016	— 0.045
— 1. — 5	+ 0.0018	+ 0.0050	+ 0.045	+ 0.184
0. — 5	— 0.0044	— 0.00227	— 0.100	— 0.703
1. — 5	+ 0.00390	+ 0.09700	+ 0.1522	+ 2.4932
2. — 5	+ 0.00416	— 0.33544	— 0.3206	— 7.5357
3. — 5	+ 0.00150	+ 1.00628	+ 1.6207	+ 19.6205
4. — 5	— 0.7358	— 2.0178	— 14.187	— 35.181
5. — 5	+ 1.5185	+ 1.1262	+ 25.787	+ 21.034
6. — 5	+ 0.0115	— 0.2013	— 2.337	— 5.056
7. — 5	+ 0.0175	+ 0.0591	+ 0.828	+ 1.836
8. — 5	+ 0.0011	— 0.0086	— 0.119	— 0.391
9. — 5	— 0.0003	+ 0.0023	+ 0.018	+ 0.110
10. — 5	+ 0.0001	— 0.0005	— 0.003	— 0.025
11. — 5	0.0000	+ 0.0001	0.000	+ 0.006
12. — 5	0.0000	0.0000	0.000	— 0.002
— 4. — 6	0.0000	0.0000	— 0.001	+ 0.001
— 3. — 6	0.0000	— 0.0001	+ 0.003	— 0.002
— 2. — 6	— 0.0003	+ 0.0002	— 0.013	+ 0.005
— 1. — 6	+ 0.0014	— 0.0005	+ 0.054	— 0.017
0. — 6	— 0.0057	+ 0.0014	— 0.207	+ 0.043
1. — 6	+ 0.0234	— 0.0026	+ 0.737	— 0.085
2. — 6	— 0.0855	+ 0.0024	— 2.369	+ 0.174
3. — 6	+ 0.2621	— 0.0045	+ 6.476	— 0.569
4. — 6	— 0.6787	+ 0.0903	— 14.832	+ 3.070
5. — 6	+ 1.0254	— 0.6041	+ 20.862	— 12.932

ε g'	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$		$\frac{a^2 . m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$	
	cos	sin	cos	sin
6. — 6	— 0.3984	+ 0.7727	— 9.249	+ 15.749
7. — 6	+ 0.1154	— 0.0092	+ 3.006	— 1.675
8. — 6	— 0.0302	+ 0.0137	— 1.036	+ 0.630
9. — 6	+ 0.0052	— 0.0001	+ 0.237	— 0.091
10. — 6	— 0.0013	0.0000	— 0.068	+ 0.017
11. — 6	+ 0.0003	0.0000	+ 0.016	— 0.003
12. — 6	0.0000	0.0000	— 0.004	0.000
13. — 6	0.0000	0.0000	+ 0.001	0.000
— 3. — 7	0.0000	0.0000	— 0.001	— 0.001
— 2. — 7	+ 0.0001	+ 0.0001	+ 0.002	+ 0.004
— 1. — 7	— 0.0002	— 0.0004	— 0.006	— 0.016
0. — 7	+ 0.0005	+ 0.0015	+ 0.016	+ 0.061
1. — 7	— 0.0011	— 0.0057	— 0.039	— 0.219
2. — 7	+ 0.0017	+ 0.0216	+ 0.081	+ 0.720
3. — 7	— 0.0032	— 0.0708	— 0.225	— 2.108
4. — 7	+ 0.0164	+ 0.1943	+ 0.850	+ 5.238
5. — 7	— 0.1229	— 0.4267	— 3.702	— 10.377
6. — 7	+ 0.4241	+ 0.4907	+ 10.178	+ 11.478
7. — 7	— 0.3827	— 0.1289	— 9.187	— 3.748
8. — 7	+ 0.0148	+ 0.0638	+ 1.193	+ 1.743
9. — 7	— 0.0094	— 0.0149	— 0.446	— 0.565
10. — 7	+ 0.0004	+ 0.0031	+ 0.067	+ 0.141
11. — 7	— 0.0002	— 0.0008	— 0.015	— 0.041
12. — 7	0.0000	+ 0.0002	+ 0.003	+ 0.009
13. — 7	0.0000	0.0000	0.000	— 0.002
14. — 7	0.0000	0.0000	0.000	+ 0.001
— 2. — 8	0.0000	0.0000	+ 0.001	— 0.001
— 1. — 8	— 0.0001	+ 0.0001	— 0.004	+ 0.002
0. — 8	+ 0.0003	— 0.0001	+ 0.018	— 0.006
1. — 8	— 0.0016	+ 0.0004	— 0.065	+ 0.015
2. — 8	+ 0.00557	— 0.00070	+ 0.2167	— 0.0358
3. — 8	— 0.01886	+ 0.00148	— 0.6624	+ 0.0877
4. — 8	+ 0.05553	— 0.00504	+ 1.7741	— 0.2859
5. — 8	— 0.1370	+ 0.0250	— 3.998	+ 1.052
6. — 8	+ 0.2515	— 0.1181	+ 6.762	— 3.618
7. — 8	— 0.2199	+ 0.2709	— 5.852	+ 7.277
8. — 8	+ 0.0348	— 0.1858	+ 1.344	— 5.181
9. — 8	— 0.0344	+ 0.0135	— 0.978	+ 0.833
10. — 8	+ 0.0074	— 0.0059	+ 0.298	— 0.299
11. — 8	— 0.0017	+ 0.0004	— 0.083	+ 0.048
12. — 8	+ 0.0004	0.0000	+ 0.024	— 0.012
13. — 8	— 0.0001	+ 0.0001	— 0.006	+ 0.002
14. — 8	0.0000	0.0000	+ 0.002	0.000
— 1. — 9	0.0000	0.0000	+ 0.001	+ 0.001
0. — 9	— 0.0001	— 0.0001	— 0.002	— 0.005
1. — 9	+ 0.0001	+ 0.0004	+ 0.006	+ 0.019
2. — 9	— 0.0002	— 0.0014	— 0.015	— 0.065
3. — 9	+ 0.0005	+ 0.0049	+ 0.035	+ 0.204
4. — 9	— 0.0019	— 0.0155	— 0.099	— 0.579
5. — 9	+ 0.0067	+ 0.0416	+ 0.334	+ 1.422
6. — 9	— 0.0285	— 0.0915	— 1.120	— 2.885
7. — 9	+ 0.0957	+ 0.1402	+ 3.103	+ 4.116
8. — 9	— 0.1625	— 0.0906	— 4.851	— 2.729
9. — 9	+ 0.0892	+ 0.0050	+ 2.851	+ 0.375
10. — 9	— 0.0106	— 0.0176	— 0.566	— 0.528
11. — 9	+ 0.0037	+ 0.0034	+ 0.193	+ 0.152
12. — 9	— 0.0003	+ 0.0011	— 0.034	— 0.048
13. — 9	+ 0.0002	+ 0.0003	+ 0.009	+ 0.014
14. — 9	0.0000	0.0000	— 0.002	— 0.004
15. — 9	0.0000	0.0000	0.000	+ 0.001

$\varepsilon \quad g'$	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$		$\frac{a^2 \cdot m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$	
	cos	sin	cos	sin
0. — 10	0.0000	0.0000	— 0.002	+ 0.001
1. — 10	+ 0.0001	— 0.0001	+ 0.006	— 0.002
2. — 10	— 0.0004	+ 0.0001	— 0.019	+ 0.006
3. — 10	+ 0.0014	— 0.0001	+ 0.062	— 0.017
4. — 10	— 0.0043	+ 0.0005	— 0.183	+ 0.036
5. — 10	+ 0.0122	— 0.0021	+ 0.482	— 0.111
6. — 10	— 0.0298	+ 0.0075	— 1.086	+ 0.358
7. — 10	+ 0.0579	— 0.0266	+ 1.964	— 1.065
8. — 10	— 0.0723	+ 0.0699	— 2.336	+ 2.423
9. — 10	+ 0.0328	— 0.0931	+ 1.123	— 3.063
10. — 10	+ 0.0025	+ 0.0425	— 0.028	+ 1.543
11. — 10	+ 0.0086	— 0.0072	+ 0.272	— 0.374
12. — 10	— 0.0016	— 0.0169	— 0.075	+ 0.121
13. — 10	+ 0.0005	— 0.0003	+ 0.027	— 0.023
14. — 10	— 0.0002	+ 0.0001	— 0.008	+ 0.006
15. — 10	0.0000	0.0000	+ 0.002	— 0.001
16. — 10	0.0000	0.0000	— 0.001	+ 0.001
0. — 11	0.0000	0.0000	0.000	+ 0.001
1. — 11	0.0000	0.0000	— 0.001	— 0.002
2. — 11	0.0000	+ 0.0001	+ 0.002	+ 0.006
3. — 11	— 0.0001	— 0.0004	— 0.005	— 0.019
4. — 11	+ 0.0002	+ 0.0012	+ 0.014	+ 0.057
5. — 11	— 0.0006	— 0.0035	— 0.038	— 0.158
6. — 11	+ 0.0022	+ 0.0093	+ 0.117	+ 0.385
7. — 11	— 0.0074	— 0.0207	— 0.353	— 0.792
8. — 11	+ 0.0227	+ 0.0348	+ 0.925	+ 1.263
9. — 11	— 0.0475	— 0.0349	— 1.762	— 1.225
10. — 11	+ 0.0510	+ 0.0091	+ 1.851	+ 0.366
11. — 11	— 0.0200	+ 0.0031	— 0.826	— 0.069
12. — 11	+ 0.0048	+ 0.0723	+ 0.239	+ 0.131
13. — 11	— 0.0012	— 0.0007	— 0.074	— 0.035
14. — 11	+ 0.0002	+ 0.0002	+ 0.016	+ 0.015
15. — 11	— 0.0001	0.0000	— 0.004	— 0.004
16. — 11	0.0000	0.0000	+ 0.001	+ 0.001
2. — 12	0.0000	0.0000	+ 0.002	— 0.001
3. — 12	— 0.0001	— 0.0001	— 0.006	+ 0.002
4. — 12	+ 0.0003	— 0.0001	+ 0.017	— 0.005
5. — 12	— 0.0009	+ 0.0002	— 0.051	+ 0.013
6. — 12	+ 0.0027	— 0.0006	+ 0.130	— 0.039
7. — 12	— 0.0067	+ 0.0022	— 0.294	+ 0.117
8. — 12	+ 0.0135	— 0.0063	+ 0.551	— 0.323
9. — 12	— 0.0199	+ 0.0170	— 0.764	+ 0.748
10. — 12	+ 0.0154	— 0.0303	+ 0.581	— 1.209
11. — 12	— 0.0004	+ 0.0270	— 0.046	+ 1.077
12. — 12	— 0.0024	+ 0.0093	— 0.079	— 0.440
13. — 12	— 0.0019	+ 0.0028	— 0.058	+ 0.149
14. — 12	+ 0.0003	— 0.0007	+ 0.016	— 0.044
15. — 12	— 0.0001	+ 0.0002	— 0.008	+ 0.010
16. — 12	0.0000	— 0.0001	+ 0.002	— 0.003
17. — 12	0.0000	0.0000	— 0.001	+ 0.001
18. — 12	0.0000	0.0000	0.000	— 0.001
3. — 13	0.0000	0.0000	+ 0.001	+ 0.002
4. — 13	0.0000	— 0.0001	— 0.002	— 0.005
5. — 13	+ 0.0001	+ 0.0003	+ 0.005	+ 0.016
6. — 13	— 0.0002	— 0.0008	— 0.013	— 0.042
7. — 13	+ 0.0005	+ 0.0022	+ 0.039	+ 0.103
8. — 13	— 0.0020	— 0.0046	— 0.110	— 0.216
9. — 13	+ 0.0056	+ 0.0086	+ 0.278	+ 0.366
10. — 13	— 0.0127	— 0.0106	— 0.568	— 0.431

ε g'	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$		$\frac{a^2 . m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$	
	cos	sin	cos	sin
11. — 13	+ 0.0183	+ 0.0059	+ 0.790	+ 0.234
12. — 13	— 0.0140	+ 0.0049	— 0.607	+ 0.064
13. — 13	+ 0.0045	— 0.0016	+ 0.234	— 0.063
14. — 13	— 0.0018	— 0.0008	— 0.090	— 0.022
15. — 13	+ 0.0005	+ 0.0001	+ 0.026	+ 0.006
16. — 13	— 0.0002	— 0.0001	— 0.007	— 0.003
17. — 13	0.0000	0.0000	+ 0.002	+ 0.001
18. — 13	0.0000	0.0000	0.000	— 0.001
4. — 14	0.0000	0.0000	— 0.002	+ 0.001
5. — 14	+ 0.0001	0.0000	+ 0.005	— 0.002
6. — 14	— 0.0002	+ 0.0001	— 0.014	+ 0.005
7. — 14	+ 0.0006	— 0.0001	+ 0.035	— 0.013
8. — 14	— 0.0015	— 0.0003	— 0.079	+ 0.037
9. — 14	+ 0.0033	— 0.0017	+ 0.153	— 0.098
10. — 14	— 0.0050	+ 0.0044	— 0.229	+ 0.227
11. — 14	+ 0.0051	— 0.0085	+ 0.224	— 0.409
12. — 14	— 0.0015	+ 0.0111	— 0.065	+ 0.495
13. — 14	— 0.0020	— 0.0071	— 0.083	— 0.333
14. — 14	+ 0.0008	+ 0.0023	+ 0.044	+ 0.125
15. — 14	+ 0.0002	— 0.0010	+ 0.006	— 0.053
16. — 14	+ 0.0001	+ 0.0002	— 0.002	+ 0.015
17. — 14	0.0000	0.0000	+ 0.002	— 0.004
18. — 14	0.0000	0.0000	— 0.001	+ 0.001
4. — 15	0.0000	0.0000	0.000	+ 0.001
5. — 15	0.0000	0.0000	— 0.001	— 0.002
6. — 15	0.0000	+ 0.0001	+ 0.002	+ 0.004
7. — 15	— 0.0001	— 0.0002	— 0.004	— 0.012
8. — 15	+ 0.0001	+ 0.0004	+ 0.013	+ 0.028
9. — 15	— 0.0005	— 0.0011	— 0.034	— 0.058
10. — 15	+ 0.0015	+ 0.0019	+ 0.085	+ 0.102
11. — 15	— 0.0032	— 0.0028	— 0.178	— 0.135
12. — 15	+ 0.0058	+ 0.0022	+ 0.285	+ 0.101
13. — 15	— 0.0061	+ 0.0002	— 0.303	+ 0.010
14. — 15	+ 0.0035	— 0.0016	+ 0.183	— 0.076
15. — 15	— 0.0011	+ 0.0006	— 0.070	+ 0.035
16. — 15	+ 0.0007	0.0000	+ 0.032	— 0.004
17. — 15	— 0.0001	0.0000	— 0.009	+ 0.001
18. — 15	0.0000	0.0000	+ 0.003	+ 0.001
19. — 15	0.0000	0.0000	— 0.001	0.000
6. — 16	0.0000	0.0000	+ 0.001	0.000
7. — 16	— 0.0001	+ 0.0001	— 0.003	+ 0.001
8. — 16	+ 0.0003	— 0.0001	+ 0.008	— 0.004
9. — 16	— 0.0005	0.0000	— 0.018	+ 0.011
10. — 16	+ 0.0009	— 0.0005	+ 0.035	— 0.029
11. — 16	— 0.0016	+ 0.0011	— 0.052	+ 0.065
12. — 16	+ 0.0017	— 0.0025	+ 0.052	— 0.123
13. — 16	— 0.0007	+ 0.0037	— 0.006	+ 0.170
14. — 16	— 0.0008	— 0.0032	— 0.064	— 0.147
15. — 16	+ 0.0013	+ 0.0012	+ 0.075	+ 0.062
16. — 16	— 0.0003	— 0.0001	— 0.029	— 0.014
17. — 16	+ 0.0001	+ 0.0002	+ 0.006	+ 0.009
18. — 16	0.0000	0.0000	— 0.003	— 0.003
19. — 16	0.0000	0.0000	0.000	+ 0.001

Um die $((i \,.\, i' \,.\, \overset{c}{s}))$ zu kontrolliren, schreibe ich

$$\sum_i((i \,.\, i' \,.\, c)) = \sum_i(i \,.\, i' \,.\, c)\; P_{-i'}^{(-i')} + \sum_i(i \,.\, i'+1 \,.\, c)\; P_{-i'}^{(-i'-1)} + \ldots$$
$$+ \sum_i(i \,.\, i'-1 \,.\, c)\; P_{-i'}^{(-i'+1)} + \ldots$$

oder

$$\sum_i((i \,.\, i' \,.\, c)) = P_{-i'}^{(-i')} \,.\, \sum_i(i \,.\, i' \,.\, c) + P_{-i'}^{(-i'-1)} \,.\, \sum_i(i \,.\, i'+1 \,.\, c) + \ldots$$
$$+ P_{-i'}^{(-i'+1)} \,.\, \sum_i(i \,.\, i'-1 \,.\, c) + \ldots$$

wodurch

$$\sum_i((i \,.\, k \,.\, c)) = \sum_{i'} \left\{ P_k^{(i')} \,.\, \sum_i(i \,.\, i' \,.\, c) \right\}$$

analog bekommt man

$$\sum_i((i \,.\, k \,.\, s)) = \sum_{i'} \left\{ P_k^{(i')} \,.\, \sum_i(i \,.\, i' \,.\, s) \right\}$$

wodurch man also eine Kontrolle für jedes i' (oder k) erhält. Eine andere Kontrolle habe ich durch Berechung von $\frac{m'}{\sin 1''}\frac{a}{\Delta}$ und $\frac{a^2 \,.\, m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$ für $\varepsilon = 15^0$ $g' = 0$ sowohl aus den Entwickelungen in Reihen wie aus der geschlossenen Funktionsform erhalten. Das Resultat dieser Rechung ist:

	$\frac{m'}{\sin 1''}\frac{a}{\Delta}$	$\frac{a^2 \,.\, m'}{\sin 1''}\left(\frac{a}{\Delta}\right)^3$
Direkt	$+ 124.''3358$	$+ 182.''951$
Reihe	$+ 124.3354$	$+ 182.946$

8.

Die nächste Aufgabe wird jetzt $a\Omega$, $ar\frac{\partial\Omega}{\partial r}$ und $a^2\frac{\partial\Omega}{\partial Z}$ zu berechnen, für welche folgende Gleichungen gelten:

$$a\Omega = \frac{m'}{\sin 1''}\frac{a}{\Delta} - (H)$$

$$ar\frac{\partial\Omega}{\partial r} = \frac{1}{2}\frac{m'}{\sin 1''}\,a^2\left(\frac{a}{\Delta}\right)^3\cdot\left\{\left(\frac{r'}{a'}\right)^2 - \frac{1}{a^2}\left(\frac{r}{a}\right)^2\right\} - \frac{1}{2}\frac{m'}{\sin 1''}\frac{a}{\Delta} - (H)$$

$$a^2\frac{\partial\Omega}{\partial Z} = -\frac{m'}{\sin 1''}\,a^2\left(\frac{a}{\Delta}\right)^3\cdot\frac{1}{a}\sin I\cdot\frac{r'}{a'}\sin(f'+\Pi') + (I)$$

wo

$$(H) = \frac{1}{a^2}\frac{m'}{\sin 1''}\cdot\left(\frac{a'}{r'}\right)^2\cdot\frac{r}{a}\cdot H$$

$$H = \cos(f+\Pi)\cos(f'+\Pi') + \cos I\sin(f+\Pi)\sin(f'+\Pi')$$

$$(I) = \frac{m'}{a^2\sin 1''}\sin I\cdot\left(\frac{a'}{r'}\right)^2\sin(f+\Pi')$$

$$\frac{1}{2}\left\{\left(\frac{r'}{a'}\right)^2 - \frac{1}{a^2}\left(\frac{r}{a}\right)^2\right\} = \frac{1}{2} + \frac{3}{4}e'^2 - \frac{1+\frac{1}{2}e^2}{2a^2} + 2\cdot\frac{e}{2a^2}\cos\varepsilon - 2\cdot\frac{e^2}{8a^2}\cos 2\varepsilon -$$

$$- 2\cdot\sum_{m=1}\frac{I^{(m)}_{m\lambda'}}{m^2}\cos mg'$$

$$-\frac{1}{a}\frac{r'}{a'}\sin I\sin(f'+\Pi') = +3e'c'_2 - 2\cdot\sum_{m=1}\frac{1}{m}(I^{(m-1)}_{m\lambda'} - I^{(m+1)}_{m\lambda'})\,c_2\cos(-mg') +$$

$$+2\cdot\sum_{m=1}\frac{1}{m}(I^{(m-1)}_{m\lambda'} + I^{(m+1)}_{m\lambda'})\,c_1\sin(-mg')$$

wo

$$c_1 = \frac{1}{2a}\sin I\cos\varphi'\cos\Pi'$$

$$c_2 = \frac{1}{2a}\sin I\sin\Pi'$$

oder mit zu Koeffizienten numerisch:

$$\frac{1}{2}\left\{\left(\frac{r'}{a'}\right)^2 - \frac{1}{a^2}\left(\frac{r}{a}\right)^2\right\} = [9.5605120] + 2\cdot[8.4303643]\cos\varepsilon + 2\cdot[7.126464_n]\cos 2\varepsilon +$$
$$+ 2\cdot[8.384714_n]\cos g' + 2\cdot[6.468314_n]\cos 2g' +$$
$$+ 2\cdot[4.85292_n]\cos 3g' + 2\cdot[3.3625_n]\cos 4g' +$$
$$+ 2\cdot[1.94_n]\cos 5g' + \text{etc.} \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{(a)}$$

$$-\frac{1}{a}\frac{r'}{a'}\sin I.\sin(f'+\Pi') = [7.8720455] + 2.[8.7086677_n]\cos(-g') +$$
$$+ 2.[7.093212_n]\cos(-2g') + 2.[5.65386_n]\cos(-3g') +$$
$$+ 2.[4.2883_n]\cos(-4g') + 2.[2.96_n]\cos(-5g') +$$
$$+ 2.[8.4369434]\sin(-g') + 2.[6.821573]\sin(-2g') +$$
$$+ 2.[5.38228]\sin(-3g') + 2.[4.0168]\sin(-4g') +$$
$$+ 2.[2.69]\sin(-5g') \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (b)$$

In Reihen entwickelt sind die (H) und (I):

$$(H) = \frac{1}{2}(h\gamma_1 - h'\delta_1)\cos(-\varepsilon - g') + \frac{1}{2}(l\gamma_1 - l'\delta_1)\sin(-\varepsilon - g')$$
$$- eh\gamma_1\cos(-g') + el'\delta_1\sin(-g')$$
$$+ \frac{1}{2}(h\gamma_1 + h'\delta_1)\cos(+\varepsilon - g') - \frac{1}{2}(l\gamma_1 + l'\delta_1)\sin(+\varepsilon - g')$$
$$+ \frac{1}{2}(h\gamma_2 - h'\delta_2)\cos(-\varepsilon - 2g') + \frac{1}{2}(l\gamma_2 - l'\delta_2)\sin(-\varepsilon - 2g')$$
$$- eh\gamma_2\cos(-2g') + el'\delta_2\sin(-2g')$$
$$+ \frac{1}{2}(h\gamma_2 + h'\delta_2)\cos(+\varepsilon - 2g') - \frac{1}{2}(l\gamma_2 + l'\delta_2)\sin(+\varepsilon - 2g')$$
$$+ \text{etc.} \qquad + \text{etc.}$$

$$(I) = + b'\gamma_1\cos(-g') + b\delta_1\sin(-g')$$
$$+ b'\gamma_2\cos(-2g') + b\delta_2\sin(-2g')$$
$$+ b'\gamma_3\cos(-3g') + b\delta_3\sin(-3g')$$
$$+ \text{etc.}$$

wo $h = \dfrac{m'}{a^2\sin 1''}k\cos(\Pi - K)$ $\qquad h' = \dfrac{m'}{a^2\sin 1''}\cos\varphi\cos\varphi'.k_1\cos(\Pi - K_1)$

$l = \dfrac{m'}{a^2\sin 1''}\cos\varphi\,.\,k\sin(\Pi - K)$ $\qquad l' = \dfrac{m'}{a^2\sin 1''}\cos\varphi'\,.\,k_1\sin(\Pi - K_1)$

$b = -\dfrac{m'}{a^2\sin 1''}\cos\varphi'\sin I\cos\Pi'$ $\qquad \gamma_m = m\left\{I^{(m-1)}_{m\lambda'} - I^{(m+1)}_{m\lambda'}\right\}$

$b' = \dfrac{m'}{a^2\sin 1''}\sin I\sin\Pi'$ $\qquad \delta_m = m\left\{I^{(m-1)}_{m\lambda'} + I^{(m+1)}_{m\lambda'}\right\}$

In den folgenden Tabellen sind die numerischen Werte der Koeffizienten dieser Reihen angegeben.

ε g'	(H)		(I)	
	cos	sin	cos	sin
−1. −1	+ 0.5762	+ 0.9732		
0. −1	− 2.2609	− 10.3244	+ 10.4815	− 5.6066
1. −1	+ 10.8030	+ 50.9910		
−1. −2	+ 0.0558	+ 0.0949		
0. −2	− 0.2192	− 1.0013	+ 1.0163	− 0.5437
1. −2	+ 1.0476	+ 4.9447		
−1. −3	+ 0.0046	+ 0.0078		
0. −3	− 0.0179	− 0.0819	+ 0.0832	− 0.0445
1. −3	+ 0.0857	+ 0.4046		
−1. −4	+ 0.0004	+ 0.0006		
0. −4	− 0.0014	− 0.0063	+ 0.0064	− 0.0034
1. −4	+ 0.0066	+ 0.0310		
−1. −5	0.0000	0.0000		
0. −5	− 0.0001	− 0.0005	+ 0.0005	− 0.0003
1. −5	+ 0.0005	+ 0.0023		
−1. −6	0.0000	0.0000		
0. −6	0.0000	0.0000		
1. −6	0.0000	+ 0.0002		

Wir bezeichnen eine beliebige der Quantitäten $a\Omega$, $ar\frac{\partial\Omega}{\partial r}$ und $a^2\frac{\partial\Omega}{\partial Z}$ in Reihen folgendermassen:

$$F = \Sigma\Sigma((i\,.\,i'\,.\,c))\cos(i\varepsilon - i'g') + \Sigma\Sigma((i\,.\,i'\,.\,s))\sin(i\varepsilon - i'g')$$

In der nächsten Tabelle sind die Koeffizienten $((i\,.\,i'\,.\,\overset{c}{s}))$ numerisch angegeben.

ε g'	$ia\Omega$		$ar\frac{\partial\Omega}{\partial r}$		$a^2\frac{\partial\Omega}{\partial Z}$	
	cos	sin	cos	sin	cos	sin
0. 0			$+\frac{1}{2}$. 36.12092		$-\frac{1}{2}$. 4.15304	
1. 0	− 3.70831	+ 0.01716	− 10.07204	− 0.06496	+ 4.90877	−14.79337
2. 0	+ 2.11172	+ 0.85742	+ 3.66607	+ 1.46529	− 0.18700	+ 1.97296
3. 0	− 0.3888	− 0.0831	− 0.7687	− 0.2259	+ 0.2989	− 0.5438
4. 0	+ 0.0920	+ 0.0504	+ 0.1741	+ 0.0943	− 0.0498	+ 0.1221
5. 0	− 0.0215	− 0.0110	− 0.0407	− 0.0222	+ 0.0168	− 0.0254
6. 0	+ 0.0048	+ 0.0030	+ 0.0087	+ 0.0061	− 0.0040	+ 0.0060
7. 0	− 0.0014	− 0.0007	− 0.0020	− 0.0016	+ 0.0010	− 0.0012
8. 0	0.0000	0.0000	+ 0.0005	+ 0.0004	− 0.0003	+ 0.0002
9. 0	0.0000	0.0000	+ 0.0002	− 0.0002	+ 0.0002	0.0000
10. 0	0.0000	0.0000	0.0000	+ 0.0001	− 0.0001	+ 0.0001
11. 0	0.0000	0.0000	− 0.0001	0.0000	0.0000	− 0.0001
− 7. −1	0.000	0.000	+ 0.001	0.000	0.000	− 0.001
− 6. −1	+ 0.001	+ 0.001	− 0.003	− 0.003	− 0.002	+ 0.002
− 5. −1	− 0.004	− 0.006	+ 0.009	+ 0.012	+ 0.008	− 0.006
− 4. −1	+ 0.014	+ 0.027	− 0.034	− 0.056	− 0.036	+ 0.026
− 3. −1	− 0.059	− 0.105	+ 0.136	+ 0.237	+ 0.182	− 0.086

ε y'	$ia\Omega$		$ar\frac{\partial\Omega}{\partial r}$		$a^2\frac{\partial\Omega}{\partial Z}$	
	cos	sin	cos	sin	cos	sin
— 2. — 1	+ 0.100	+ 0.457	— 0.389	— 1.106	— 0.745	+ 0.465
— 1. — 1	— 0.251	— 0.902	+ 1.451	+ 3.665	+ 3.340	— 0.411
0. — 1	0.000	0.000	+ 0.424	— 9.116	— 9.331	+ 5.654
1. — 1	+ 0.738	+ 5.875	+ 2.861	+19.725	— 1.497	— 3.467
2. — 1	+ 0.712	— 3.441	+ 0.687	— 6.241	+ 9.380	+ 1.211
3. — 1	— 0.536	+ 1.906	— 0.802	+ 2.806	— 1.152	— 0.102
4. — 1	+ 0.059	— 0.296	+ 0.124	— 0.517	+ 0.381	+ 0.166
5. — 1	— 0.036	+ 0.076	— 0.060	+ 0.126	— 0.079	— 0.028
6. — 1	+ 0.007	— 0.017	+ 0.013	— 0.029	+ 0.017	+ 0.011
7. — 1	— 0.002	+ 0.004	— 0.004	+ 0.006	— 0.004	— 0.003
8. — 1	+ 0.001	— 0.001	+ 0.001	— 0.001	+ 0.001	+ 0.001
9. — 1	0.000	0.000	— 0.001	+ 0.001	0.000	0.000
— 6. — 2	+ 0.001	— 0.001	— 0.001	+ 0.001	+ 0.001	+ 0.001
— 5. — 2	— 0.002	+ 0.002	+ 0.004	— 0.003	— 0.002	— 0.003
— 4. — 2	+ 0.007	— 0.004	— 0.017	+ 0.013	+ 0.010	+ 0.012
— 3. — 2	— 0.031	+ 0.017	+ 0.076	— 0.050	— 0.036	— 0.051
— 2. — 2	+ 0.109	— 0.053	— 0.324	+ 0.183	+ 0.136	+ 0.259
— 1. — 2	— 0.366	+ 0.170	+ 1.501	— 0.720	— 0.604	— 0.988
0. — 2	0.000	0.000	— 5.867	+ 3.010	+ 2.004	+ 4.678
1. — 2	+ 8.947	— 3.089	+21.721	— 6.731	—10.601	—11.718
2. — 2	—41.191	+17.137	—46.939	+18.752	+ 2.239	— 1.955
3. — 2	+ 2.866	+ 0.835	+ 4.255	+ 0.802	+ 0.312	+ 5.427
4. — 2	— 1.481	— 0.207	— 1.997	— 0.301	+ 0.060	— 0.683
5. — 2	+ 0.214	+ 0.038	+ 0.341	+ 0.066	— 0.080	+ 0.255
6. — 2	— 0.059	— 0.023	— 0.090	— 0.035	+ 0.014	— 0.050
7. — 2	+ 0.013	+ 0.004	+ 0.020	+ 0.008	— 0.006	+ 0.012
8. — 2	— 0.002	— 0.002	— 0.005	— 0.003	+ 0.001	— 0.003
9. — 2	+ 0.001	0.000	+ 0.001	+ 0.001	0.000	0.000
— 5. — 3	+ 0.001	+ 0.001	— 0.001	— 0.001	— 0.001	+ 0.001
— 4. — 3	— 0.002	— 0.002	+ 0.005	+ 0.005	+ 0.004	— 0.003
— 3. — 3	+ 0.005	+ 0.008	— 0.018	— 0.023	— 0.016	+ 0.013
— 2. — 3	— 0.015	— 0.030	+ 0.068	+ 0.102	+ 0.071	— 0.048
— 1. — 3	+ 0.002	+ 0.093	— 0.238	— 0.455	— 0.342	+ 0.190
0. — 3	0.000	0.000	+ 0.7106	+ 2.0269	+ 1.3137	— 0.5756
1. — 3	+ 0.1155	— 2.1325	— 1.5876	— 6.9861	— 4.9204	+ 1.7676
2. — 3	— 0.2001	+12.8503	+ 3.3701	+19.9986	+ 5.5762	— 7.9693
3. — 3	—15.560	—23.673	—16.518	—26.189	+ 1.758	+ 1.1838
4. — 3	— 0.604	+ 2.271	— 0.563	+ 3.012	— 2.943	+ 0.707
5. — 3	— 0.016	— 1.038	+ 0.017	— 1.329	+ 0.413	+ 0.031
6. — 3	— 0.023	+ 0.150	— 0.033	+ 0.223	— 0.164	— 0.030
7. — 3	+ 0.013	— 0.043	+ 0.018	— 0.062	+ 0.032	+ 0.007
8. — 3	— 0.002	+ 0.009	— 0.005	+ 0.013	— 0.008	— 0.003
9. — 3	+ 0.001	— 0.002	+ 0.002	— 0.003	+ 0.002	+ 0.001
10. — 3	0.000	0.000	— 0.001	+ 0.001	0.000	0.000
— 5. — 4	0.000	0.000	0.000	+ 0.001	0.000	0.000
— 4. — 4	0.000	0.000	+ 0.001	— 0.001	— 0.001	— 0.001
— 3. — 4	+ 0.002	— 0.001	— 0.007	+ 0.006	+ 0.004	+ 0.005
— 2. — 4	— 0.008	+ 0.004	+ 0.030	— 0.022	— 0.017	— 0.021
— 1. — 4	+ 0.021	— 0.006	— 0.133	+ 0.079	+ 0.057	+ 0.096
0. — 4	0.000	0.000	+ 0.560	— 0.224	— 0.199	— 0.389
1. — 4	— 0.412	— 0.028	— 2.074	+ 0.611	+ 0.508	+ 1.288
2. — 4	+ 2.757	+ 0.260	+ 6.179	— 1.296	— 2.131	— 3.626
3. — 4	—11.201	+ 1.874	—14.840	+ 4.606	+ 5.288	+ 2.119
4. — 4	+12.090	—11.518	+13.257	—12.029	— 0.498	+ 1.322
5. — 4	— 1.711	— 0.303	— 2.114	— 0.257	— 0.652	— 1.515
6. — 4	+ 0.674	— 0.100	+ 0.836	— 0.108	— 0.010	+ 0.253
7. — 4	— 0.103	— 0.011	— 0.145	— 0.014	+ 0.006	— 0.101
8. — 4	+ 0.030	+ 0.007	+ 0.042	+ 0.008	— 0.003	+ 0.020
9. — 4	— 0.006	— 0.002	— 0.009	— 0.002	+ 0.002	— 0.006
10. — 4	+ 0.001	+ 0.001	+ 0.002	+ 0.001	0.000	+ 0.001

ε g'	$ia\Omega$		$ar\frac{\partial\Omega}{\partial r}$		$a^2\frac{\partial\Omega}{\partial Z}$	
	cos	sin	cos	sin	cos	sin
— 4. — 5	0.000	0.000	— 0.001	0.000	0.000	0.000
— 3. — 5	0.000	— 0.001	+ 0.002	+ 0.002	+ 0.001	— 0.002
— 2. — 5	+ 0.001	+ 0.002	— 0.008	— 0.009	— 0.006	+ 0.006
— 1. — 5	— 0.002	— 0.005	+ 0.026	+ 0.039	+ 0.027	— 0.020
0. — 5	0.000	0.000	— 0.082	— 0.161	— 0.112	+ 0.062
1. — 5	+ 0.0034	+ 0.0947	+ 0.2194	+ 0.6130	+ 0.3849	— 0.1990
2. — 5	+ 0.0083	— 0.6709	— 0.5716	— 1.9615	— 1.1498	+ 0.5372
3. — 5	+ 0.0044	+ 3.0187	+ 1.3478	+ 5.2016	+ 2.2634	— 2.0221
4. — 5	— 2.943	— 8.071	— 4.775	— 9.788	— 0.481	+ 3.215
5. — 5	+ 7.593	+ 5.631	+ 7.864	+ 6.208	— 0.889	— 0.130
6. — 5	+ 0.069	— 1.208	+ 0.026	— 1.436	+ 0.747	— 0.476
7. — 5	+ 0.123	+ 0.414	+ 0.137	+ 0.501	— 0.155	+ 0.003
8. — 5	+ 0.009	— 0.069	+ 0.003	— 0.094	+ 0.060	— 0.004
9. — 5	— 0.003	+ 0.021	— 0.002	+ 0.027	— 0.012	— 0.001
10. — 5	+ 0.001	— 0.005	+ 0.001	— 0.005	+ 0.004	+ 0.001
11. — 5	0.000	+ 0.001	— 0.001	+ 0.001	— 0.001	0.000
— 3. — 6	0.000	0.000	+ 0.001	— 0.001	— 0.001	0.000
— 2. — 6	+ 0.001	0.000	— 0.002	+ 0.002	+ 0.002	+ 0.002
— 1. — 6	— 0.001	+ 0.001	+ 0.011	— 0.009	— 0.006	— 0.008
0. — 6	0.000	0.000	— 0.047	+ 0.027	+ 0.021	+ 0.031
1. — 6	+ 0.023	— 0.002	+ 0.178	— 0.078	— 0.064	— 0.116
2. — 6	— 0.171	+ 0.005	— 0.606	+ 0.205	+ 0.188	+ 0.351
3. — 6	+ 0.786	— 0.013	+ 1.714	— 0.527	— 0.552	— 0.897
4. — 6	— 2.715	+ 0.361	— 3.990	+ 1.423	+ 1.645	+ 1.220
5. — 6	+ 5.127	— 3.021	+ 5.877	— 4.149	— 1.819	+ 0.157
6. — 6	— 2.390	+ 4.636	— 2.692	+ 4.786	— 0.032	— 0.550
7. 6	+ 0.808	— 0.064	+ 0.934	— 0.101	+ 0.310	+ 0.353
8. — 6	— 0.242	+ 0.110	— 0.288	+ 0.122	— 0.010	— 0.094
9. — 6	+ 0.047	— 0.001	+ 0.060	— 0.002	+ 0.007	+ 0.033
10. — 6	— 0.013	0.000	— 0.018	0.000	0.000	— 0.008
11. — 6	+ 0.003	0.000	+ 0.004	+ 0.001	0.000	+ 0.002
12. — 6	0.000	0.000	— 0.001	0.000	0.000	— 0.001
— 2. — 7	0.000	0.000	+ 0.001	+ 0.001	0.000	— 0.001
— 1. — 7	0.000	0.000	— 0.003	— 0.003	— 0.002	+ 0.002
0. — 7	0.000	0.000	+ 0.009	+ 0.013	+ 0.009	— 0.007
1. — 7	— 0.001	— 0.006	— 0.027	— 0.052	— 0.034	+ 0.021
2. — 7	+ 0.003	+ 0.043	+ 0.073	+ 0.180	+ 0.109	— 0.063
3. — 7	— 0.010	— 0.212	— 0.191	— 0.550	— 0.293	+ 0.179
4. — 7	+ 0.066	+ 0.777	+ 0.502	+ 1.398	+ 0.622	— 0.519
5. — 7	— 0.615	— 2.134	— 1.391	— 2.819	— 0.552	+ 1.199
6. — 7	+ 2.545	+ 2.944	+ 3.199	+ 3.245	— 0.321	— 0.963
7. — 7	— 2.679	— 0.902	— 2.769	— 1.065	+ 0.319	— 0.081
8. — 7	+ 0.118	+ 0.510	+ 0.147	+ 0.581	— 0.161	+ 0.188
9. — 7	— 0.085	— 0.134	— 0.094	— 0.160	+ 0.037	— 0.011
10. — 7	+ 0.004	+ 0.031	+ 0.005	+ 0.039	— 0.020	+ 0.006
11. — 7	— 0.002	— 0.009	— 0.001	— 0.011	+ 0.005	0.000
12. — 7	0.000	+ 0.002	0.000	+ 0.002	— 0.001	0.000
— 1. — 8	0.000	0.000	— 0.001	+ 0.001	+ 0.001	+ 0.001
0. — 8	0.000	0.000	+ 0.004	— 0.003	— 0.002	— 0.003
1. — 8	— 0.002	0.000	— 0.015	+ 0.009	+ 0.007	+ 0.010
2. — 8	+ 0.01114	— 0.00140	+ 0.0531	— 0.0253	— 0.0203	— 0.0326
3. — 8	— 0.05658	+ 0.00450	— 0.1696	+ 0.0673	+ 0.0598	+ 0.0949
4. — 8	+ 0.22188	— 0.02044	+ 0.4686	— 0.1795	— 0.1663	— 0.2266
5. — 8	— 0.685	+ 0.125	— 1.071	+ 0.476	+ 0.445	+ 0.385
6. — 8	+ 1.509	— 0.709	+ 1.846	— 1.238	— 0.803	— 0.183
7. — 8	— 1.539	+ 1.896	— 1.646	+ 2.262	+ 0.477	— 0.297
8. — 8	+ 0.278	— 1.486	+ 0.367	— 1.544	+ 0.080	+ 0.174
9. — 8	— 0.310	+ 0.122	— 0.345	+ 0.144	— 0.108	— 0.071
10. — 8	+ 0.074	— 0.059	+ 0.086	— 0.066	+ 0.010	+ 0.033

ε g'	$ia\Omega$		$ar\frac{\partial\Omega}{\partial r}$		$a^2\frac{\partial\Omega}{\partial Z}$	
	cos	sin	cos	sin	cos	sin
11. — 8	−0.019	+0.004	−0.024	+0.005	−0.005	−0.011
12. — 8	+0.005	0.000	+0.006	−0.002	0.000	+0.003
13. — 8	−0.001	+0.001	−0.002	0.000	0.000	−0.001
0. — 9	0.000	0.000	−0.001	−0.001	−0.001	+0.001
1. — 9	0.000	0.000	+0.003	+0.004	+0.003	−0.002
2. — 9	0.000	−0.003	−0.009	−0.016	−0.010	+0.007
3. — 9	+0.001	+0.015	+0.024	+0.051	+0.030	−0.019
4. — 9	−0.008	−0.062	−0.063	−0.150	−0.078	+0.056
5. — 9	+0.034	+0.208	+0.167	+0.377	+0.161	−0.148
6. — 9	−0.171	−0.549	−0.434	−0.774	−0.210	+0.351
7. — 9	+0.670	+0.981	+1.012	+1.123	+0.007	−0.501
8. — 9	−1.300	−0.725	−1.496	−0.755	+0.220	+0.218
9. — 9	+0.803	+0.045	+0.839	+0.095	−0.091	+0.063
10. — 9	−0.106	−0.176	−0.119	−0.196	+0.030	−0.060
11. — 9	+0.041	+0.037	+0.044	+0.046	−0.019	+0.009
12. — 9	−0.004	+0.013	−0.005	−0.016	+0.006	−0.004
13. — 9	+0.003	+0.004	+0.001	+0.004	−0.002	0.000
14. — 9	0.000	0.000	0.000	−0.001	+0.001	0.000
1. — 10	0.000	0.000	+0.001	−0.001	−0.001	−0.001
2. — 10	−0.001	0.000	−0.004	+0.003	+0.002	+0.003
3. — 10	+0.004	0.000	+0.016	−0.009	−0.006	−0.009
4. — 10	−0.017	+0.002	−0.047	+0.022	+0.008	+0.025
5. — 10	+0.061	−0.011	+0.126	−0.058	−0.050	−0.059
6. — 10	−0.179	+0.045	−0.289	+0.153	+0.126	+0.105
7. — 10	+0.405	−0.186	+0.526	−0.377	−0.257	−0.096
8. — 10	−0.578	+0.559	−0.634	+0.769	+0.293	−0.058
9. — 10	+0.295	−0.838	+0.299	−0.938	−0.089	+0.145
10. — 10	+0.025	+0.425	−0.002	+0.448	−0.043	−0.045
11. — 10	+0.095	−0.079	+0.105	−0.089	+0.033	+0.012
12. — 10	−0.019	−0.203	−0.023	+0.038	−0.006	−0.010
13. — 10	+0.007	−0.004	+0.009	−0.004	+0.002	+0.003
14. — 10	−0.003	+0.001	−0.002	+0.001	0.000	−0.001
15. — 10	0.000	0.000	+0.001	0.000	0.000	0.000
2. — 11	0.000	0.000	+0.001	+0.001	+0.001	−0.001
3. — 11	0.000	−0.001	−0.003	−0.005	−0.002	+0.002
4. — 11	+0.001	+0.005	+0.008	+0.014	+0.008	−0.006
5. — 11	−0.003	−0.017	−0.020	−0.041	−0.020	+0.017
6. — 11	+0.013	+0.056	+0.053	+0.101	+0.042	−0.043
7. — 11	−0.052	−0.145	−0.135	−0.209	−0.062	+0.101
8. — 11	+0.182	+0.278	+0.310	+0.336	+0.031	−0.176
9. — 11	−0.428	−0.314	−0.550	−0.327	+0.069	+0.162
10. — 11	+0.510	+0.091	+0.563	+0.088	−0.089	−0.030
11. — 11	−0.220	+0.034	−0.237	+0.021	+0.021	−0.028
12. — 11	+0.058	+0.868	+0.062	+0.020	−0.005	+0.018
13. — 11	−0.016	−0.009	−0.018	−0.011	+0.006	−0.004
14. — 11	+0.003	+0.003	+0.003	+0.005	−0.002	+0.002
15. — 11	−0.002	0.000	−0.001	−0.002	+0.001	0.000
3. — 12	0.000	0.000	−0.001	+0.001	+0.001	+0.001
4. — 12	+0.001	0.000	+0.004	−0.002	−0.002	−0.002
5. — 12	−0.004	+0.001	−0.013	+0.007	+0.005	+0.007
6. — 12	+0.016	−0.004	+0.034	−0.018	−0.015	−0.015
7. — 12	−0.047	+0.015	−0.077	+0.048	+0.036	+0.028
8. — 12	+0.108	−0.050	+0.145	−0.115	−0.076	−0.032
9. — 12	−0.179	+0.153	−0.201	+0.242	+0.114	−0.002
10. — 12	+0.154	−0.303	+0.150	−0.373	−0.084	+0.059
11. — 12	−0.004	+0.297	−0.001	+0.325	+0.006	−0.051
12. — 12	−0.029	+0.112	−0.022	−0.135	+0.017	+0.009
13. — 12	−0.025	+0.036	−0.026	+0.041	−0.009	−0.002

ε g'	$ia\Omega$		$ar\frac{\partial\Omega}{\partial r}$		$a^2\frac{\partial\Omega}{\partial Z}$	
	cos	sin	cos	sin	cos	sin
14. — 12	+0.004	−0.010	+0.006	−0.011	+0.003	+0.003
15. — 12	−0.002	+0.003	−0.003	+0.002	−0.001	−0.001
16. — 12	0.000	−0.002	+0.001	0.000	0.000	0.000
4. — 13	0.000	0.000	−0.001	−0.001	−0.001	+0.001
5. — 13	0.000	+0.001	+0.002	+0.004	+0.002	−0.002
6. — 13	−0.001	−0.005	−0.006	−0.011	−0.005	+0.005
7. — 13	+0.004	+0.015	+0.016	+0.027	+0.011	−0.013
8. — 13	−0.016	−0.037	−0.042	−0.056	−0.017	+0.029
9. — 13	+0.050	+0.077	+0.094	+0.095	+0.013	−0.055
10. — 13	−0.127	−0.106	−0.179	−0.111	+0.015	+0.070
11. — 13	+0.201	+0.065	+0.242	+0.056	−0.043	−0.040
12. — 13	−0.168	+0.059	−0.182	+0.024	+0.028	−0.003
13. — 13	+0.059	−0.021	+0.066	−0.017	−0.004	+0.010
14. — 13	−0.025	−0.011	−0.026	−0.011	+0.001	−0.005
15. — 13	+0.008	+0.002	+0.006	+0.003	−0.001	+0.002
16. — 13	−0.003	−0.002	−0.002	−0.001	0.000	−0.001
4. — 14	+0.001	0.000	−0.001	0.000	0.000	0.000
5. — 14	0.000	0.000	+0.001	−0.001	−0.001	−0.001
6. — 14	−0.001	+0.001	−0.004	+0.002	+0.001	+0.002
7. — 14	+0.004	−0.001	+0.009	−0.006	−0.004	−0.004
8. — 14	−0.012	−0.002	−0.020	+0.015	+0.011	+0.007
9. — 14	+0.030	−0.015	+0.040	−0.035	−0.022	−0.009
10. — 14	−0.050	+0.044	−0.059	+0.074	+0.038	+0.003
11. — 14	+0.056	−0.094	+0.056	−0.127	−0.040	+0.017
12. — 14	−0.018	+0.133	−0.011	+0.150	+0.017	−0.028
13. — 14	−0.026	−0.092	−0.028	−0.099	+0.005	+0.015
14. — 14	+0.011	+0.032	+0.012	+0.036	−0.006	−0.001
15. — 14	+0.003	−0.015	+0.004	−0.016	+0.003	0.000
16. — 14	+0.002	+0.003	−0.001	+0.004	−0.001	−0.001
17. — 14	0.000	0.000	+0.001	−0.001	0.000	0.000
5. — 15	0.000	0.000	0.000	−0.001	0.000	0.000
6. — 15	0.000	+0.001	+0.001	+0.001	0.000	−0.001
7. — 15	−0.001	−0.001	−0.002	−0.004	−0.001	+0.001
8. — 15	+0.001	+0.003	+0.005	+0.010	+0.003	−0.004
9. — 15	−0.005	−0.010	−0.013	−0.020	−0.005	+0 009
10. — 15	+0.015	+0.019	+0.029	+0.035	+0.004	−0.016
11. — 15	−0.035	−0.031	−0.057	−0.045	+0.002	+0.025
12. — 15	+0.070	+0.026	+0.088	+0.032	−0.013	−0.022
13. — 15	−0.079	+0.003	−0.092	+0.004	+0.016	+0.007
14. — 15	+0.049	−0.022	+0.055	−0.026	−0.005	+0.003
15. — 15	−0.017	+0.009	−0.021	+0.013	−0.002	−0.002
16. — 15	+0.011	0.000	+0.009	−0.004	+0.001	+0.001
17. — 15	−0.002	0.000	−0.002	+0.001	0.000	0.000
18. — 15	0.000	0.000	+0.001	0.000	0.000	0.000
7. — 16	−0.001	+0.001	−0.001	+0.001	+0.001	0.000
8. — 16	+0.002	−0.001	+0.002	−0.002	−0.001	−0.001
9. — 16	−0.005	0.000	−0.004	+0.004	+0.004	+0.002
10. — 16	+0.009	−0.005	+0.008	−0.010	−0.008	−0.003
11. — 16	−0.018	+0.012	−0.012	+0.021	+0.013	+0.002
12. — 16	+0.020	−0.030	+0.010	−0.038	−0.018	+0.004
13. — 16	−0.009	+0.048	+0.005	+0.051	+0.016	−0.011
14. — 16	−0.011	−0.045	−0.025	−0.042	−0.007	+0.011
15. — 16	+0.020	+0.018	+0.025	+0.016	+0.002	−0.005
16. — 16	−0.005	−0.002	−0.008	−0.003	−0.001	+0.002
17. — 16	+0.002	+0.003	+0.001	+0.002	0.000	−0.001
18. — 16	0.000	0.000	−0.001	−0.001	0.000	0.000

Die Kontrolle der vorigen Koeffizienten ist folgendermassen ausgeführt. Erst habe ich die mekanischen Multiplikationen dadurch geprüft, dass ich die verschiedenen Koeffizienten in der Entwickelung von $\frac{1}{2}\left\{\left(\frac{r'}{a'}\right)^2 - \frac{1}{a^2}\left(\frac{r}{a}\right)^2\right\}$ und $-\frac{1}{a}\sin I \cdot \frac{r'}{a'}\sin(f' + \Pi')$ mit den Summen $\sum_i((i \,.\, i' \,.\, \overset{c}{s}))$ aus der Entwickelung von $\frac{m'}{\sin 1''} a^2 \left(\frac{a}{\Delta}\right)^3$ für jedes i' multiplicirt habe und damit die Summen der entsprechenden Glieder in

$$\frac{1}{2}\frac{m'}{\sin 1''} a^2 \left(\frac{a}{\Delta}\right)^3 \cdot \left\{\left(\frac{r'}{a'}\right)^2 - \frac{1}{a^2}\left(\frac{r}{a}\right)^2\right\}$$

und

$$-\frac{m'}{\sin 1''} a^2 \left(\frac{a}{\Delta}\right)^3 \cdot \frac{1}{a}\sin I \cdot \frac{r'}{a'}\sin(f' + \Pi')$$

für jedes i' verglichen, welche Prüfung vollständig stimmt. Danach habe ich $ar\frac{\partial \Omega}{\partial r}$ und $a^2\frac{\partial \Omega}{\partial Z}$ für $\varepsilon = 15^0$ $g' = 0^0$ teils direkt teils durch Reihen berechnet und als Resultat dabei bekommen:

	$ar\frac{\partial \Omega}{\partial r}$	$a^2\frac{\partial \Omega}{\partial Z}$
Direkt	$-19''.518$	$-17''.816$
Reihe	-19.531	-17.808

Dieselbe Rechnung habe ich auch für $\varepsilon = 0^0$ und $g' = 15^0$ ausgeführt und ergab sich daraus:

	$ar\frac{\partial \Omega}{\partial r}$	$a^2\frac{\partial \Omega}{\partial Z}$
Direkt	$-13''.680$	$+3''.705$
Reihe	-13.664	$+3.723$

Diese Kontrolle stimmt nicht so gut, wie ich erwartet habe. Da ich einen Fehler in den Koeffizienten der Reihen (a) und (b) Paragraf (8) vermutete, habe ich sie dadurch kontrollirt, dass ich sowohl die linke wie die rechte Seite von (a) für $\varepsilon = 15^0$, $g' = 0^0$, von (b) für $g' = 15^0$ berechnet habe. Das Resultat war:

für	(a)	(b)
Direkt	$+0.3641258$	-0.1083941
Reihe	$+0.3641261$	-0.1083942

Auch die (H) und (I) sind auf derselben Weise für $\varepsilon = 0^0$ und $g' = 15^0$ kontrollirt:

	(H)	(I)
Direkt	$-3.''426$	$+12.''824$
Reihe	-3.426	$+12.824$

Da auch hier kein Fehler vorliegt, ist es mir unmöglich den etwaigen Fehler zu entdecken. Dass die vorigen Kontrollen viel besser stimmen, beruht sehr wahrscheinlich auf der Ursache, dass ich da immer die Rechnung mit einer Dezimale mehr ausgeführt, als ich nachher angesetzt habe. Hier habe ich aber nur mit drei Dezimalen gerechnet, und kleine Fehler in der letzten Dezimale können sich leicht in der Kontrolle gehäuft haben.

9.

Nachdem jetzt die Störungsfunktion und die partiellen Differentialquotienten derselben entwickelt sind, wird die nächste Aufgabe das Argument g' gegen $\mu\varepsilon$ zu vertauschen.

Schreiben wir

$$F = \Sigma\Sigma((i\,.\,i'.\,c))\cos(i\varepsilon - i'g') + \Sigma\Sigma((i\,.\,i'.\,s))\sin(i\varepsilon - i'g')$$

und

$$F = \Sigma\Sigma[i\,.\,i'\,.\,c]\cos(i\varepsilon - i'V) + \Sigma\Sigma[i\,.\,i'\,.\,s]\sin(i\varepsilon - i'V)$$

$$V = c' - \mu c + \mu\varepsilon$$

so besteht folgende Relation zwischen den Koeffizienten der beiden Entwickelungen:

$$[i\,.\,i'\,.\,{}^{c}_{s}] = ((i\,.\,i'\,.\,{}^{c}_{s}))\,I^{(0)}_{i'\lambda} + ((i-1\,.\,i'\,.\,{}^{c}_{s}))\,.\,I^{(1)}_{i'\lambda} + ((i-2\,.\,i'\,.\,{}^{c}_{s}))\,.\,I^{(2)}_{i'\lambda} + \ldots.$$
$$- ((i+1\,.\,i'\,.\,{}^{c}_{s}))\,.\,I^{(1)}_{i'\lambda} + ((i+2\,.\,i'\,.\,{}^{c}_{s}))\,.\,I^{(2)}_{i'\lambda} - \ldots.$$

wo

$$\lambda = \frac{1}{2}\mu e$$

Die I-Funktionen sind aus den im Paragraf (7) angegebenen Formeln berechnet. Die folgende Tabelle giebt eine Zusammenstellung dieser Funktionen.

i'	$\log I^{(0)}_{i'\lambda}$	$\log I^{(1)}_{i'\lambda}$	$\log I^{(2)}_{i'\lambda}$	$\log I^{(3)}_{i'\lambda}$	$\log I^{(4)}_{i'\lambda}$	$\log I^{(5)}_{i'\lambda}$
1	9.999394	8.5720	6.84	4.9		
2	9.99757	8.8721	7.445	5.8		
3	9.9945308	9.046656	7.79592	6.370	4.82	
4	9.99025	9.1695	8.044	6.74		
5	9.984722	9.263638	8.23638	7.0315	5.70	4.27
6	9.9779	9.3395	8.393	7.27		
7	9.9698	9.402	8.524	7.47		
8	9.96033	9.45582	8.6367	7.638	6.51	5.3
9	9.9495	9.502	8.74	7.79		
10	9.937	9.542	8.82	7.92		
11	9.923	9.576	8.90	8.0		
12	9.908	9.607	8.97	8.15		
13	9.891	9.634	9.04	8.3		
14	9.872	9.658	9.10	8.3		
15	9.85	9.68	9.15	8.43		
16	9.83	9.70	9.20	8.5		
17	9.80	9.76	9.3	8.6		
18	9.8	9.7	9.3			
19	9.7	9.7	9.3			

Mit Hülfe dieser Werte von I habe ich die $[i \,.\, i' \,.\, c]$ und $[i \,.\, i' \,.\, s]$ berechnet, und die folgende Tabelle stellt das Resultat dar.

ε	V	$ia\Omega$		$ar\frac{\partial\Omega}{\partial r}$		$a^2\frac{\partial\Omega}{\partial Z}$	
		cos	sin	cos	sin	cos	sin
0.	0			$+\frac{1}{2}$. 36.12092		$-\frac{1}{2}$. 4.15304	
1.	0	— 3.70831	+ 0.01716	— 10.07204	— 0.06496	+ 4.90877	—14.79337
2.	0	+ 2.11172	+ 0.85742	+ 3.66607	+ 1.46529	— 0.18700	+ 1.97296
3.	0	— 0.3888	— 0.0831	— 0.7687	— 0.2259	+ 0.2989	— 0.5438
4.	0	+ 0.0920	+ 0.0504	+ 0.1741	+ 0.0943	— 0.0498	+ 0.1221
5.	0	— 0.0215	— 0.0110	— 0.0407	— 0.0222	+ 0.0168	— 0.0254
6.	0	+ 0.0048	+ 0.0030	+ 0.0087	+ 0.0061	— 0.0040	+ 0.0060
7.	0	— 0.0014	— 0.0007	— 0.0020	— 0.0016	+ 0.0010	— 0.0012
8.	0	0.0000	0.0000	+ 0.0005	+ 0.0004	— 0.0003	+ 0.0002
9.	0	0.0000	0.0000	+ 0.0002	— 0.0002	+ 0.0002	0.0000
10.	0	0.0000	0.0000	0.0000	+ 0.0001	— 0.0001	+ 0.0001
11.	0	0.0000	0.0000	— 0.0001	0.0000	0.0000	— 0.0001
— 7.	—1	0.000	0.000	+ 0.001	0.000	0.000	— 0.001
— 6.	—1	+ 0.001	+ 0.001	— 0.003	— 0.003	— 0.002	+ 0.002
— 5.	—1	— 0.005	— 0.006	+ 0.010	+ 0.014	+ 0.009	— 0.007
— 4.	—1	+ 0.016	+ 0.031	— 0.039	— 0.065	— 0.044	+ 0.029
— 3.	—1	— 0.062	— 0.122	+ 0.050	+ 0.280	+ 0.212	— 0.101
— 2.	—1	+ 0.107	+ 0.486	— 0.437	— 1.241	— 0.868	+ 0.481
— 1.	—1	— 0.245	— 0.881	+ 1.421	+ 3.972	+ 3.654	— 0.607
0.	—1	— 0.036	— 0.256	+ 0.370	— 9.707	— 9.132	+ 5.760
1.	—1	+ 0.710	+ 5.996	+ 2.847	+19.595	— 2.192	— 3.296
2.	—1	+ 0.758	— 3.289	+ 0.823	— 5.608	+ 9.348	+ 1.089
3.	—1	— 0.510	+ 1.789	— 0.777	+ 2.603	— 0.816	— 0.065
4.	—1	+ 0.041	— 0.230	+ 0.096	— 0.419	+ 0.346	+ 0.164
5.	—1	— 0.035	+ 0.067	— 0.056	+ 0.109	— 0.067	— 0.022
6.	—1	+ 0.005	— 0.014	+ 0.011	— 0.024	+ 0.014	+ 0.010
7.	—1	— 0.002	+ 0.002	— 0.004	+ 0.005	— 0.003	— 0.003
8.	—1	+ 0.001	— 0.001	+ 0.001	— 0.001	+ 0.001	+ 0.001
9.	—1	0.000	0.000	— 0.001	+ 0.001	0.000	0.000

ε V	$ia\Omega$		$ar\frac{\partial\Omega}{\partial r}$		$a^2\frac{\partial\Omega}{\partial Z}$	
	cos	sin	cos	sin	cos	sin
— 6. — 2	+ 0.001	— 0.001	— 0.001	+ 0.001	+ 0.001	+ 0.001
— 5. — 2	— 0.002	+ 0.002	+ 0.005	— 0.004	— 0.003	— 0.004
— 4. — 2	+ 0.009	— 0.005	— 0.024	+ 0.018	+ 0.013	+ 0.017
— 3. — 2	— 0.040	+ 0.021	+ 0.103	— 0.065	— 0.047	— 0.073
— 2. — 2	+ 0.133	— 0.064	— 0.446	+ 0.240	+ 0.184	+ 0.342
— 1. — 2	— 0.328	+ 0.155	+ 1.970	— 0.946	— 0.770	— 1.344
0. — 2	— 0.810	+ 0.291	— 7.472	+ 3.493	+ 2.743	+ 5.447
1. — 2	+11.973	— 4.346	+24.674	— 7.867	—10.561	—11.147
2. — 2	—40.511	+16.749	—45.397	+18.093	+ 1.420	— 3.211
3. — 2	— 0.082	+ 2.114	+ 0.946	+ 2.198	+ 0.443	+ 5.272
4. — 2	— 1.391	— 0.099	— 1.825	— 0.193	+ 0.094	— 0.299
5. — 2	+ 0.111	+ 0.029	+ 0.206	+ 0.050	— 0.074	+ 0.222
6. — 2	— 0.048	— 0.021	— 0.070	— 0.032	+ 0.008	— 0.034
7. — 2	+ 0.010	+ 0.002	+ 0.015	+ 0.005	— 0.005	+ 0.009
8. — 2	— 0.002	— 0.002	— 0.003	— 0.002	+ 0.001	— 0.002
9. — 2	+ 0.001	0.000	+ 0.001	+ 0.001	0.000	0.000
— 5. — 3	+ 0.001	+ 0.001	— 0.002	— 0.002	— 0.001	+ 0.001
— 4. — 3	— 0.002	— 0.003	+ 0.007	+ 0.008	+ 0.006	— 0.005
— 3. — 3	+ 0.006	+ 0.012	— 0.026	— 0.036	— 0.026	+ 0.020
— 2. — 3	— 0.014	— 0.039	+ 0.096	+ 0.163	+ 0.116	— 0.071
— 1. — 3	+ 0.001	+ 0.072	— 0.317	— 0.713	— 0.509	+ 0.260
0. — 3	— 0.0104	+ 0.3334	+ 0.8773	+ 2.8604	+ 1.8419	— 0.7945
1. — 3	+ 0.0392	— 3.6846	— 1.9686	— 9.0670	— 5.3238	+ 2.5771
2. — 3	+ 1.5440	+15.1023	+ 4.9912	+21.9181	+ 4.7525	— 7.8037
3. — 3	—15.320	—22.219	—15.883	—24.022	+ 2.657	+ 0.214
4. — 3	— 2.329	— 0.197	— 2.376	+ 0.331	— 2.724	+ 0.777
5. — 3	— 0.178	— 0.934	— 0.145	— 1.162	+ 0.111	+ 0.118
6. — 3	— 0.033	+ 0.046	— 0.040	+ 0.092	— 0.137	— 0.022
7. — 3	+ 0.010	— 0.033	+ 0.015	— 0.045	+ 0.016	+ 0.004
8. — 3	— 0.001	+ 0.005	— 0.003	+ 0.007	— 0.006	— 0.003
9. — 3	+ 0.001	— 0.001	+ 0.001	— 0.002	+ 0.001	0.000
10. — 3	0.000	0.000	0.000	0.000	0.000	0.000
— 5. — 4	0.000	0.000	0.000	+ 0.001	0.000	0.000
— 4. — 4	0.000	0.000	+ 0.002	— 0.002	— 0.002	— 0.002
— 3. — 4	+ 0.003	— 0.002	— 0.012	+ 0.012	+ 0.008	+ 0.009
— 2. — 4	— 0.011	+ 0.005	+ 0.056	— 0.035	— 0.026	— 0.038
— 1. — 4	+ 0.012	— 0.005	— 0.235	+ 0.115	+ 0.089	+ 0.164
0. — 4	+ 0.099	+ 0.005	+ 0.909	— 0.314	— 0.289	— 0.597
1. — 4	— 0.940	— 0.039	— 3.030	+ 0.813	+ 0.843	+ 1.761
2. — 4	+ 4.427	— 0.154	+ 8.083	— 1.995	— 2.797	— 3.657
3. — 4	—12.356	+ 3.570	—15.603	+ 6.093	+ 4.927	+ 1.338
4. — 4	+10.458	—10.938	+11.159	—11.059	+ 0.369	+ 1.793
5. — 4	— 0.110	— 1.962	— 0.395	— 1.958	— 0.652	— 1.302
6. — 4	+ 0.549	— 0.267	+ 0.664	— 0.280	— 0.109	+ 0.055
7. — 4	— 0.018	— 0.036	— 0.040	— 0.034	— 0.003	— 0.080
8. — 4	+ 0.022	+ 0.006	+ 0.029	+ 0.005	— 0.002	+ 0.008
9. — 4	— 0.003	— 0.001	— 0.005	— 0.001	+ 0.002	— 0.004
10. — 4	0.000	+ 0.001	+ 0.001	+ 0.001	0.000	0.000
— 4. — 5	0.000	0.000	— 0.001	— 0.001	— 0.001	+ 0.001
— 3. — 5	— 0.001	— 0.001	+ 0.004	+ 0.004	+ 0.003	— 0.003
— 2. — 5	+ 0.001	+ 0.002	— 0.014	— 0.019	— 0.013	+ 0.010
— 1. — 5	— 0.001	— 0.002	+ 0.043	+ 0.079	+ 0.053	— 0.033
0. — 5	— 0.001	— 0.034	— 0.126	— 0.300	— 0.196	+ 0.105
1. — 5	+ 0.0054	+ 0.2755	+ 0.3309	+ 1.0234	+ 0.6020	— 0.3179
2. — 5	— 0.0510	— 1.3295	— 0.8509	— 2.9138	— 1.4640	+ 0.9098
3. — 5	+ 0.6768	+ 4.3712	+ 2.2117	+ 6.5768	+ 2.0528	— 2.4486
4. — 5	— 4.233	— 8.304	— 5.815	— 9.692	+ 0.108	+ 2.757
5. — 5	+ 6.780	+ 4.235	+ 6.736	+ 4.558	— 1.048	+ 0.518

ε V	$ia\Omega$		$ar\frac{\partial\Omega}{\partial r}$		$a^2\frac{\partial\Omega}{\partial Z}$	
	cos	sin	cos	sin	cos	sin
6. — 5	+1·387	−0·346	+1·362	−0·503	+0·581	−0·431
7. — 5	+0·257	+0·280	+0·267	+0·335	−0·040	−0·083
8. — 5	+0·041	−0·010	+0·037	−0·023	+0·044	−0·011
9. — 5	+0·001	+0·014	+0·001	+0·018	−0·003	−0·002
10. — 5	+0·001	−0·002	+0·001	−0·001	+0·002	+0·001
11. — 5	0·000	0·000	0·000	+0·001	−0·001	0·000
— 3. — 6	0·000	0·000	+0·001	−0·001	−0·001	0·000
— 2. — 6	+0·001	0·000	−0·006	+0·004	+0·004	+0·005
— 1. — 6	0·000	+0·001	+0·026	−0·014	−0·013	−0·018
0. — 6	−0·010	+0·001	−0·099	+0·048	+0·039	+0·063
1. — 6	+0·084	−0·005	+0·343	−0·133	−0·114	−0·204
2. — 6	−0·408	+0·022	−1·023	+0·337	+0·331	+0·535
3. — 6	+1·436	−0·173	+2·523	−0·877	−0·891	−1·042
4. — 6	−3·592	+1·117	−4·784	+2·266	+1·842	+0·923
5. — 6	+4·842	−3·807	+5·368	−4·694	−1·368	+0·523
6. — 6	−1·402	+3·772	−1·580	+3·701	−0·457	−0·539
7. — 6	+0·420	+0·854	+0·501	+0·816	+0·248	+0·243
8. — 6	−0·112	+0·199	−0·138	+0·204	+0·054	−0·032
9. — 6	+0·012	+0·029	+0·017	+0·030	+0·012	+0·021
10. — 6	−0·008	+0·003	−0·009	+0·003	+0·002	−0·001
11. — 6	+0·001	0·000	+0·001	+0·001	0·000	+0·001
12. — 6	+0·001	0·000	+0·002	0·000	0·000	−0·001
— 2. — 7	0·009	0·000	+0·002	+0·002	+0·001	−0·002
— 1. — 7	0·000	0·000	−0·006	−0·009	−0·005	+0·005
0. — 7	0·000	+0·005	+0·017	+0·032	+0·020	−0·013
1. — 7	−0·002	−0·028	−0·049	−0·114	−0·070	+0·042
2. — 7	+0·010	+0·125	+0·131	+0·349	+0·191	−0·120
3. — 7	−0·053	−0·462	−0·345	−0·925	−0·422	+0·326
4. — 7	+0·307	+1·313	+0·890	+1·993	+0·638	−0·775
5. — 7	−1·289	−2·578	−2·076	−3·145	−0·276	+1·233
6. — 7	+2·900	+2·479	+3·352	+2·650	−0·505	−0·587
7. — 7	−1·909	−0·299	−1·861	−0·415	+0·242	−0·329
8. — 7	−0·461	+0·375	−0·435	+0·415	−0·092	+0·129
9. — 7	−0·131	−0·026	−0·134	−0·037	+0·009	+0·030
10. — 7	−0·020	+0·011	−0·021	+0·015	−0·015	+0·009
11. — 7	−0·004	−0·003	−0·003	−0·004	+0·001	+0·003
12. — 7	−0·001	+0·002	0·000	0·000	−0·001	0·000
13. — 7	0·000	+0·001	0·000	+0·001	0·000	0·000
— 2. — 8	0·000	0·000	+0·001	−0·001	−0·001	0·000
— 1. — 8	0·000	0·000	−0·003	+0·002	+0·002	+0·002
0. — 8	+0·001	0·000	+0·011	−0·006	−0·005	−0·007
1. — 8	−0·008	+0·001	−0·038	+0·018	+0·015	+0·023
2. — 8	+0·03895	−0·00416	+0·11840	−0·05027	−0·04327	−0·06574
3. — 8	−0·14862	+0·01867	−0·32912	+0·13257	+0·11952	+0·15983
4. — 8	+0·45466	−0·09255	+0·77466	−0·34550	−0·29952	−0·29746
5. — 8	−1·063	+0·400	−1·451	+0·844	+0·611	+0·329
6. — 8	+1·644	−1·218	+1·886	−1·715	−0·744	+0·027
7. — 8	−1·096	+1·964	−1·139	+2·178	+0·197	−0·360
8. — 8	−0·031	−0·883	+0·043	−0·858	+0·207	+0·090
9. — 8	−0·285	−0·218	−0·299	−0·198	−0·061	−0·038
10. — 8	−0·009	−0·077	−0·004	−0·078	−0·015	+0·019
11. — 8	−0·010	−0·014	−0·012	−0·014	−0·006	−0·004
12. — 8	+0·001	−0·002	+0·002	−0·003	−0·001	+0·001
13. — 8	0·000	+0·001	0·000	0·000	0·000	−0·001
0. — 9	0·000	0·000	−0·003	−0·003	−0·003	+0·002
1. — 9	0·000	+0·002	+0·007	+0·012	+0·009	−0·005
2. — 9	−0·002	−0·011	−0·019	−0·039	−0·023	+0·015

ε V	$ia\Omega$		$ar\frac{\partial\Omega}{\partial r}$		$a^2\frac{\partial\Omega}{\partial Z}$	
	cos	sin	cos	sin	cos	sin
3. — 9	+0.007	+0.046	+0.050	+0.115	+0.058	−0.043
4. — 9	−0.029	−0.152	−0.133	−0.290	−0.122	+0.114
5. — 9	+0.127	+0.400	+0.332	+0.604	+0.186	−0.255
6. — 9	−0.431	−0.779	−0.743	−0.978	−0.129	+0.440
7. — 9	+1.003	+0.944	+1.295	+1.020	−0.128	−0.410
8. — 9	−1.214	−0.387	−1.307	−0.398	+0.219	+0.032
9. — 9	+0.376	−0.081	+0.366	−0.033	−0.024	+0.119
10. — 9	+0.082	−0.188	+0.072	−0.194	+0.016	−0.028
11. — 9	+0.040	−0.030	+0.040	−0.016	−0.013	−0.006
12. — 9	+0.008	+0.013	+0.009	−0.011	+0.001	−0.003
13. — 9	+0.003	+0.008	+0.001	0.000	−0.001	0.000
14. — 9	+0.001	+0.002	0.000	−0.001	0.000	0.000
1. — 10	0.000	0.000	+0.003	−0.003	−0.002	−0.003
2. — 10	−0.004	0.000	−0.012	+0.007	+0.005	+0.008
3. — 10	+0.014	−0.002	+0.040	−0.020	−0.011	−0.021
4. — 10	−0.050	+0.011	−0.103	+0.049	+0.031	+0.046
5. — 10	+0.143	−0.039	+0.235	−0.128	−0.104	−0.084
6. — 10	−0.317	+0.143	−0.437	+0.303	+0.203	+0.103
7. — 10	+0.513	−0.401	+0.603	−0.610	−0.289	−0.021
8. — 10	−0.472	+0.742	−0.488	+0.902	+0.201	−0.130
9. — 10	+0.078	−0.692	+0.077	−0.729	+0.025	+0.116
10. — 10	+0.056	+0.125	+0.027	+0.142	−0.061	+0.001
11. — 10	+0.112	+0.098	+0.114	+0.009	+0.012	+0.007
12. — 10	+0.019	−0.180	+0.016	+0.025	+0.003	−0.008
13. — 10	+0.006	−0.076	+0.007	+0.008	+0.002	+0.001
14. — 10	0.000	−0.014	+0.001	+0.002	0.000	−0.002
15. — 10	−0.001	−0.002	+0.001	0.000	0.000	0.000
2. — 11	0.000	+0.001	+0.003	+0.004	+0.003	−0.002
3. — 11	0.000	−0.004	−0.007	−0.013	−0.006	+0.005
4. — 11	+0.003	+0.014	+0.015	+0.032	+0.016	−0.014
5. — 11	−0.013	−0.045	−0.044	−0.082	−0.032	+0.035
6. — 11	+0.043	+0.114	+0.112	+0.171	+0.052	−0.079
7. — 11	−0.135	−0.225	−0.249	−0.289	−0.046	+0.146
8. — 11	+0.325	+0.309	+0.454	+0.344	−0.021	−0.178
9. — 11	−0.502	−0.220	−0.589	−0.208	+0.099	+0.092
10. — 11	+0.385	+0.033	+0.403	−0.024	−0.060	+0.030
11. — 11	−0.059	−0.260	−0.064	+0.022	−0.006	−0.031
12. — 11	+0.010	+0.768	+0.011	+0.031	−0.004	+0.006
13. — 11	−0.004	+0.297	−0.007	−0.004	+0.004	0.000
14. — 11	0.000	+0.056	−0.001	+0.002	0.000	+0.002
15. — 11	−0.001	+0.006	0.000	−0.001	0.000	+0.001
16. — 11	−0.001	0.000	0.000	−0.001	0.000	0.000
3. — 12	−0.002	0.000	−0.004	+0.003	+0.002	+0.003
4. — 12	+0.006	0.000	+0.012	−0.008	−0.006	−0.006
5. — 12	−0.015	+0.006	−0.030	+0.018	+0.013	+0.013
6. — 12	+0.043	−0.016	+0.071	−0.046	−0.034	−0.023
7. — 12	−0.096	+0.049	−0.130	+0.107	+0.067	+0.030
8. — 12	+0.156	−0.129	+0.183	−0.213	−0.102	−0.011
9. — 12	−0.168	+0.255	−0.172	+0.337	+0.100	−0.041
10. — 12	+0.061	−0.299	+0.050	−0.360	−0.029	+0.068
11. — 12	+0.054	+0.087	+0.048	+0.191	−0.025	−0.022
12. — 12	−0.004	+0.169	+0.005	−0.027	+0.015	−0.008
13. — 12	−0.032	+0.104	−0.031	+0.007	−0.002	−0.003
14. — 12	−0.009	+0.020	−0.007	−0.001	+0.001	+0.002
15. — 12	−0.002	+0.005	−0.003	0.000	−0.001	0.000
16. — 12	−0.001	0.000	+0.001	+0.001	0.000	0.000
17. — 12	0.000	−0.001	0.000	0.000	0.000	0.000

ε V	$ia\Omega$		$ar\frac{\partial\Omega}{\partial r}$		$a^2\frac{\partial\Omega}{\partial Z}$	
	cos	sin	cos	sin	cos	sin
4. — 13	0.000	−0.002	−0.003	−0.004	−0.003	+0.003
5. — 13	+0.001	+0.006	+0.008	+0.012	+0.005	−0.006
6. — 13	−0.005	−0.014	−0.017	−0.025	−0.010	+0.012
7. — 13	+0.016	+0.036	+0.040	+0.052	+0.015	−0.027
8. — 13	−0.049	−0.068	−0.091	+0.088	−0.011	+0.050
9. — 13	+0.111	+0.099	+0.163	+0.107	−0.008	−0.066
10. — 13	−0.179	−0.076	−0.229	−0.073	+0.036	+0.052
11. — 13	+0.167	−0.017	+0.205	−0.007	−0.038	−0.004
12. — 13	−0.049	+0.072	−0.087	+0.040	+0.008	−0.018
13. — 13	−0.035	+0.020	+0.008	+0.006	+0.004	+0.006
14. — 13	+0.012	−0.011	−0.011	−0.013	+0.001	−0.002
15. — 13	−0.010	−0.005	0.000	−0.004	0.000	+0.001
16. — 13	+0.002	−0.001	−0.001	−0.001	0.000	−0.001
	−0.001	−0.001	0.000	0.000	0.000	0.000
4. — 14	0.000	0.000	−0.002	0.000	0.000	0.000
5. — 14	+0.002	0.000	+0.004	−0.003	−0.002	−0.003
6. — 14	−0.006	0.000	−0.011	+0.008	+0.005	+0.005
7. — 14	+0.012	−0.002	+0.019	−0.016	−0.012	−0.006
8. — 14	−0.027	+0.011	−0.038	+0.036	+0.022	+0.007
9. — 14	+0.048	−0.047	+0.056	−0.074	−0.034	−0.003
10. — 14	−0.054	+0.088	−0.055	+0.120	+0.039	−0.012
11. — 14	+0.028	−0.124	+0.022	−0.149	−0.023	+0.028
12. — 14	+0.021	+0.108	+0.027	+0.113	−0.004	−0.019
13. — 14	−0.027	−0.037	−0.024	−0.038	+0.011	0.000
14. — 14	−0.008	+0.002	−0.006	+0.006	−0.003	+0.001
15. — 14	+0.004	−0.007	+0.005	−0.007	0.000	+0.001
16. — 14	+0.003	−0.001	+0.002	−0.002	−0.001	0.000
17. — 14	+0.001	+0.001	+0.002	0.000	0.000	0.000
	0.000	0.000	0.000	+0.001	0.000	0.000
5. — 15	0.000	0.000	0.000	−0.002	0.000	+0.001
6. — 15	0.000	+0.001	+0.003	+0.005	+0.001	−0.003
7. — 15	−0.001	−0.005	−0.007	−0.012	−0.004	+0.003
8. — 15	+0.007	+0.011	+0.014	+0.021	+0.004	−0.009
9. — 15	−0.019	−0.019	−0.030	−0.034	−0.004	+0.017
10. — 15	+0.037	+0.027	+0.057	+0.042	−0.002	−0.023
11. — 15	−0.063	−0.026	−0.085	−0.031	+0.010	+0.022
12. — 15	+0.078	+0.003	+0.091	0.000	−0.016	−0.008
13. — 15	−0.054	+0.024	−0.059	+0.028	+0.007	−0.003
14. — 15	+0.016	−0.016	+0.017	−0.020	+0.003	+0.004
15. — 15	−0.003	−0.004	−0.004	0.000	−0.002	0.000
16. — 15	+0.005	+0.001	+0.003	−0.001	−0.001	0.000
17. — 15	+0.002	0.000	+0.001	0.000	+0.001	+0.001
18. — 15	+0.001	0.000	0.000	−0.001	0.000	0.000
6. — 16	0.000	0.000	+0.001	−0.001	−0.001	0.000
7. — 16	−0.002	0.000	−0.003	+0.003	+0.003	+0.001
8. — 16	+0.007	−0.002	+0.003	−0.005	−0.003	−0.003
9. — 16	−0.011	+0.006	−0.008	+0.011	+0.009	+0.002
10. — 16	+0.015	−0.016	+0.011	−0.022	−0.013	−0.001
11. — 16	−0.020	+0.029	−0.009	+0.038	+0.018	−0.005
12. — 16	+0.008	−0.048	−0.002	−0.051	−0.016	+0.010
13. — 16	+0.010	+0.044	+0.019	+0.043	+0.007	−0.012
14. — 16	−0.022	−0.020	−0.025	−0.016	0.000	+0.006
15. — 16	+0.009	−0.001	+0.009	−0.001	+0.001	−0.001
16. — 16	+0.004	0.000	+0.007	+0.001	0.000	+0.001
17. — 16	+0.001	+0.003	−0.002	+0.002	−0.001	−0.001
18. — 16	+0.001	+0.003	0.000	0.000	0.000	−0.001
19. — 16	0.000	+0.003	−0.001	−0.001	0.000	0.000

Um diese Quantitäten zu kontrolliren, mache ich folgende Summirung:

$$\sum_i [i \,.\, i' \,.\, {}^{c}_{s}] = \sum_i ((i \,.\, i' \,.\, {}^{c}_{s}))\, I^{(0)}_{i'\lambda} + \sum_i ((i-1 \,.\, i' \,.\, {}^{c}_{s}))\, I^{(1)}_{i'\lambda} + \sum_i ((i-2 \,.\, i' \,.\, {}^{c}_{s}))\, I^{(2)}_{i'\lambda} + \ldots$$
$$- \sum_i ((i+1 \,.\, i' \,.\, {}^{c}_{s}))\, I^{(1)}_{i'\lambda} + \sum_i ((i+2 \,.\, i' \,.\, {}^{c}_{s}))\, I^{(2)}_{i'\lambda} - \ldots$$

oder

$$\sum_i [i \,.\, i' \,.\, {}^{c}_{s}] = I^{(0)}_{i'\lambda} \cdot \sum_i ((i \,.\, i' \,.\, {}^{c}_{s})) + I^{(1)}_{i'\lambda} \cdot \sum_i ((i \,.\, i' \,.\, {}^{c}_{s})) + I^{(2)}_{i'\lambda} \cdot \sum_i ((i \,.\, i' \,.\, {}^{c}_{s})) + \ldots$$
$$- I^{(1)}_{i'\lambda} \cdot \sum_i ((i \,.\, i' \,.\, {}^{c}_{s})) + I^{(2)}_{i'\lambda} \cdot \sum_i ((i \,.\, i' \,.\, {}^{c}_{s})) - \ldots$$

d. h.

$$\sum_i [i \,.\, i' \,.\, {}^{c}_{s}] = [I^{(0)}_{i'\lambda} + I^{(1)}_{i'\lambda} + I^{(2)}_{i'\lambda} + I^{(3)}_{i'\lambda} + \ldots - I^{(1)}_{i'\lambda} + I^{(2)}_{i'\lambda} - I^{(3)}_{i'\lambda} + \ldots] \sum_i ((i \,.\, i' \,.\, {}^{c}_{s}))$$

also

$$\sum_i [i \,.\, i' \,.\, {}^{c}_{s}] = [I^{(0)}_{i'\lambda} + 2I^{(2)}_{i'\lambda} + 2I^{(4)}_{i'\lambda} + \ldots] \sum_i ((i \,.\, i' \,.\, {}^{c}_{s}))$$

Erinnern wir uns aber die Gleichungen

$$\cos(2k \sin\varphi) = I^{(0)}_k + 2I^{(2)}_k \cos 2\varphi + 2I^{(4)}_k \cos 4\varphi + \ldots$$
$$\sin(2k \cos\varphi) = \quad + 2I^{(1)}_k \cos \varphi - 2I^{(3)}_k \cos 3\varphi + \ldots$$

und setzen hier $\varphi = 0$, so wird

$$1 = I^{(0)}_k + 2I^{(2)}_k + 2I^{(4)}_k + \ldots$$
$$\sin 2k = \quad + 2I^{(1)}_k - 2I^{(3)}_k + \ldots$$

also

$$\sum_i [i \,.\, i' \,.\, {}^{c}_{s}] = \sum_i ((i \,.\, i' \,.\, {}^{c}_{s}))$$

(Diese zwei Relationen zwischen den I-Koeffizienten sind als Kontrolle dieser Koeffizienten pag. (56) angewandt).

Diese Kontrolle allein ist doch nicht völlig befriedigend.

Die Berechnung von $[i \,.\, i' \,.\, {}^{c}_{s}]$ ist nämlich folgendermassen ausgeführt. Für ein bestimmtes i' habe ich auf einer Zeile die $((i \,.\, i' \,.\, {}^{c}_{s}))\ I^{(0)}_{i'\lambda}$ für die verschiedenen i geschrieben, darunter auf der nächsten Zeile die zugehörigen $((i-1 \,.\, i' \,.\, {}^{c}_{s}))\ I^{(1)}_{i'\lambda}$ etc.; wenn eine solche Zeile einen Schritt links oder c rechts verschoben ist, werden alle zugehörigen $[i \,.\, i' \,.\, {}^{c}_{s}]$ falsch, und die Kontrolle kann doch vollständig stimmen. Um dies zu kontrolliren, habe ich noch eine Kontrolle ausgeführt. Für $i = 3$ und 9 habe ich die linke (Reihe) wie die rechte Seite (Direkt) der folgenden Gleichung berechnet:

$$\sum_{i'}[i\,.\,i'\,.\,{}^{c}_{s}] = \sum_{i'}((i\,.\,i'\,.\,{}^{c}_{s}))\,I^{(0)}_{i'\lambda} + \sum_{i'}((i-1\,.\,i'\,.\,{}^{c}_{s}))\,I^{(1)}_{i'\lambda} + \sum_{i'}((i-2\,.\,i'\,.\,{}^{c}_{s}))\,I^{(2)}_{i'\lambda} + \ldots$$

$$- \sum_{i'}((i+1\,.\,i'\,.\,{}^{c}_{s}))\,I^{(1)}_{i'\lambda} + \sum_{i'}((i+2\,.\,i'\,.\,{}^{c}_{s}))\,I^{(2)}_{i'\lambda} - \ldots$$

Folgende Tabelle giebt das Resultat dieser Kontrollen.

	$ia\Omega$		$ar\frac{\partial\Omega}{\partial r}$		$a^2\frac{\partial\Omega}{\partial Z}$	
	Reihe	Direkt	Reihe	Direkt	Reihe	Direkt
	cos					
i'						
1	+ 0.744	+ 0.746	+ 4.413	+ 4.414	+ 0.460	+ 0.462
2	−30.976	−30.977	−27.318	−27.321	− 6.553	− 6.550
3	−16.2863	−16.2861	−14.7725	−14.7727	+ 0.7746	+ 0.7741
4	+ 2.132	+ 2.132	+ 1.583	+ 1.584	+ 2.358	+ 2.354
5	+ 4.8632	+ 4.8626	+ 4.1876	+ 4.1873	+ 0.6800	+ 0.6806
6	+ 1.265	+ 1.262	+ 1.143	+ 1.135	− 0.312	− 0.312
7	− 0.653	− 0.655	− 0.538	− 0.540	− 0.284	− 0.282
8	− 0.5124	− 0.5127	− 0.4396	− 0.4399	− 0.0246	− 0.0242
9	− 0.029	− 0.037	− 0.033	− 0.037	+ 0.046	+ 0.048
10	+ 0.097	+ 0.093	+ 0.084	+ 0.082	+ 0.015	+ 0.012
11	+ 0.051	+ 0.046	+ 0.037	+ 0.038	− 0.001	− 0.001
12	− 0.009	− 0.007	− 0.007	− 0.003	− 0.001	− 0.006
13	− 0.019	− 0.019	− 0.015	− 0.011	− 0.001	− 0.001
14	− 0.003	− 0.001	+ 0.001	− 0.001	− 0.002	+ 0.001
15	+ 0.006	+ 0.007	+ 0.001	+ 0.001	− 0.003	0.000
16	0.000	+ 0.005	0.000	0.000	+ 0.004	+ 0.001
i						
3	−26.336	−26.338	−27.178	−27.177	+ 8.112	+ 8.114
9	− 0.484	− 0.485	− 0.558	− 0.557	+ 0.128	+ 0.125
	sin					
i'						
1	+ 3.573	+ 3.577	+ 9.511	+ 9.507	+ 3.434	+ 3.432
2	+14.825	+14.822	+14.990	+14.993	− 4.804	− 4.805
3	−11.5394	−11.5389	− 9.6671	− 9.6668	− 4.7282	− 4.7282
4	− 9.817	− 9.823	− 8.638	− 8.643	− 0.552	− 0.554
5	− 0.8489	− 0.8475	− 0.8592	− 0.8596	+ 0.9704	+ 0.9698
6	+ 2.013	+ 2.011	+ 1.691	+ 1.698	+ 0.477	+ 0.476
7	+ 0.915	+ 0.911	+ 0.808	+ 0.800	− 0.049	− 0.051
8	− 0.1228	− 0.1223	− 0.0940	− 0.0936	− 0.1242	− 0.1240
9	− 0.213	− 0.210	− 0.212	− 0.208	− 0.028	− 0.030
10	− 0.287	− 0.287	− 0.043	− 0.042	+ 0.013	+ 0.014
11	+ 0.844	+ 0.845	− 0.016	− 0.010	+ 0.013	+ 0.014
12	+ 0.250	+ 0.249	+ 0.009	+ 0.012	+ 0.002	+ 0.002
13	+ 0.038	+ 0.038	+ 0.002	+ 0.001	0.000	− 0.002
14	− 0.008	− 0.006	− 0.005	− 0.005	− 0.001	0.000
15	− 0.003	− 0.005	− 0.005	− 0.005	+ 0.002	+ 0.001
16	+ 0.001	0.000	+ 0.001	+ 0.001	− 0.004	0.000
i						
3	−10.951	−10.950	− 8.135	− 8.135	+ 3.701	+ 3.698
9	− 0.900	− 0.900	− 0.807	− 0.809	+ 0.237	+ 0.236

10.

Nachdem die Rechnungen, welche sich auf die Entwickelung der störenden Kräfte beziehen, ausgeführt sind, haben wir die Differenzialgleichungen zu integriren.

Es sind

$$\frac{dz}{dt} = \Sigma\Sigma\, I(i\,.\,i'\,.\,c)\cos(i\varepsilon - i'V) + \Sigma\Sigma\, P(i\,.\,i'\,.\,s)\sin(i\varepsilon - i'V)$$

$$2\frac{d\nu}{dt} = \Sigma\Sigma\, Q(i\,.\,i'\,.\,s)\cos(i\varepsilon - i'V) - \Sigma\Sigma\, Q(i\,.\,i'\,.\,c)\sin(i\varepsilon - i'V)$$

$$\frac{1}{\cos i}\cdot\frac{du}{d\varepsilon} = \Sigma\Sigma\, W(i\,.\,i'\,.\,s)\cos(i\varepsilon - i'V) - \Sigma\Sigma\, W(i\,.\,i'\,.\,c)\sin(i\varepsilon - i'V)$$

$$nz = -\Sigma\Sigma\, R(i\,.\,i'\,.\,s)\cos(i\varepsilon - i'V) + \Sigma\Sigma\, R(i\,.\,i'\,.\,c)\sin(i\varepsilon - i'V)$$

$$2\nu = \Sigma\Sigma\, S(i\,.\,i'\,.\,c)\cos(i\varepsilon - i'V) + \Sigma\Sigma\, S(i\,.\,i'\,.\,s)\sin(i\varepsilon - i'V)$$

$$\frac{u}{\cos i} = \Sigma\Sigma\, Y(i\,.\,i'\,.\,c)\cos(i\varepsilon - i'V) + \Sigma\Sigma\, Y(i\,.\,i'\,.\,s)\sin(i\varepsilon - i'V)$$

wo

$$P(i\,.\,i'\,.\,c) = \frac{F(i\,.\,i'\,.\,c)}{m} + \frac{G(i+1\,.\,i'\,.\,c)}{m+1} + \frac{H(i-1\,.\,i'\,.\,c)}{m-1}$$

$$Q(i\,.\,i'\,.\,c) = -\frac{G(i+1\,.\,i'\,.\,c)}{m+1} - \frac{H(i-1\,.\,i'\,.\,c)}{m-1}$$

$$W(i\,.\,i'\,.\,c) = -\frac{U(i+1\,.\,i'\,.\,c)}{m+1} + \frac{V(i-1\,.\,i'\,.\,c)}{m-1}$$

$$R(i\,.\,i'\,.\,c) = \frac{P(i\,.\,i'\,.\,c) - \frac{e}{2}P(i+1\,.\,i'\,.\,c) - \frac{e}{2}P(i-1\,.\,i'\,.\,c)}{m}$$

$$S(i\,.\,i'\,.\,c) = \frac{Q(i\,.\,i'\,.\,c)}{m}$$

$$Y(i\,.\,i'\,.\,c) = \frac{T(i\,.\,i'\,.\,c)}{m} + \frac{U(i+1\,.\,i'\,.\,c)}{m+1} + \frac{V(i-1\,.\,i'\,.\,c)}{m-1}$$

$$m = i - i'\mu$$

und ganz analog für $P(i\,.\,i'\,.\,s)$ etc.

Unsere nächste Aufgabe wird jetzt F, G, H, T, U und V zu berechnen. Setzt man

$$ia\Omega = \Sigma\Sigma\beta(i\,.\,i'\,.\,c)\cos(i\varepsilon - i'V) + \Sigma\Sigma\beta(i\,.\,i'\,.\,s)\sin(i\varepsilon - i'V)$$

$$ar\frac{\partial\Omega}{\partial r} = \Sigma\Sigma c(i\,.\,i'\,.\,c)\cos(i\varepsilon - i'V) + \Sigma\Sigma c(i\,.\,i'\,.\,s)\sin(i\varepsilon - i'V)$$

$$a^2\frac{\partial\Omega}{\partial Z} = \Sigma\Sigma d(i\,.\,i'\,.\,c)\cos(i\varepsilon - i'V) + \Sigma\Sigma d(i\,.\,i'\,.\,s)\sin(i\varepsilon - i'V)$$

und $\quad A_1 = \dfrac{3e^2}{2\cos^2\varphi} \qquad A_2 = \dfrac{3e}{2\cos^2\varphi} \qquad C_1 = \dfrac{e^2}{2\cos^2\varphi}$

$$C_2 = \frac{e}{2\cos^2\varphi} \qquad N_1 = \frac{e^2}{4} \qquad N_2 = \frac{3e}{4}$$

wird

$$G(i\,.\,i'\,.\,{}^c_s) = \frac{1}{3}A_1\beta(i+1\,.\,i\,.\,{}^c_s) - A_2\beta(i\,.\,i'\,.\,{}^c_s) + A_1\beta(i-1\,.\,i'\,.\,{}^c_s) - \frac{1}{3}A_2\beta(i-2\,.\,i'\,.\,{}^c_s) +$$
$$+ 2\beta(i-1\,.\,i'\,.\,{}^c_s) +$$
$$+ C_1c(i+1\,.\,i'\,.\,{}^c_s) - C_2c(i\,.\,i'\,.\,{}^c_s) - C_1c(i-1\,.\,i'\,.\,{}^c_s) + C_2c(i-2\,.\,i'\,.\,{}^c_s) - c(i-1\,.\,i'\,.\,{}^c_s);$$

$$H(i\,.\,i'\,.\,{}^c_s) = \frac{1}{3}A_1\beta(i-1\,.\,i'\,.\,{}^c_s) - A_2\beta(i\,.\,i'\,.\,{}^c_s) + A_1\beta(i+1\,.\,i'\,.\,{}^c_s) - \frac{1}{3}A_2\beta(i+2\,.\,i'\,.\,{}^c_s) +$$
$$+ 2\beta(i+1\,.\,i\,.\,c) -$$
$$- C_1c(i-1\,.\,i'\,.\,{}^c_s) + C_2c(i\,.\,i'\,.\,{}^c_s) + C_1c(i+1\,.\,i'\,.\,{}^c_s) - C_2c(i+2\,.\,i'\,.\,{}^c_s) + c(i+1\,.\,i\,.\,{}^c_s);$$

$$F(i\,.\,i'\,.\,{}^c_s) = -\frac{1}{2}\left\{G(i+1\,.\,i'\,.\,{}^c_s) + H(i-1\,.\,i'\,.\,{}^c_s)\right\} - \beta(i\,.\,i'\,.\,{}^c_s);$$

Diese Formeln gelten auch für $i' = 0$. Dabei ist zu bemerken, dass es vorteilhaft ist diese F, G und U auch für negative i zu berechnen. Man braucht dann nicht die H und V zu berechnen, weil

$$H(i\,.\,o\,.\,c) = -G(-i\,.\,o\,.\,c) \qquad V(i\,.\,o\,.\,c) = -U(-i\,.\,o\,.\,c)$$
$$H(i\,.\,o\,.\,s) = \quad G(-i\,.\,o\,.\,s) \qquad V(i\,.\,o\,.\,s) = \quad U(-i\,.\,o\,.\,s)$$

Die später aufgestellte Kontrolle ist unter diesen Bedingungen für $i' = 0$ anwendbar.

$$U(i\,.\,i'\,{}^c_s) = N_1d(i+1\,.\,i'\,.\,{}^c_s) - N_2d(i\,.\,i'\,.\,{}^c_s) + N_1d(i-1\,.\,i'\,.\,{}^c_s) - \frac{1}{3}N_2d(i-2\,.\,i'\,.\,{}^c_s) +$$
$$+ \frac{1}{2}d(i-1\,.\,i'\,.\,{}^c_s);$$

$$V(i\,.\,i'\,.\,{}^c_s) = -N_1d(i-1\,.\,i'\,.\,{}^c_s) + N_2d(i\,.\,i'\,.\,{}^c_s) - N_1d(i+1\,.\,i'\,.\,{}^c_s) + \frac{1}{3}N_2d(i+2\,.\,i'\,.\,{}^c_s) -$$
$$- \frac{1}{2}d(i+1\,.\,i'\,.\,{}^c_s);$$

$$T(i\,.\,i'\,.\,{}^c_s) = -U(i+1\,.\,i'\,.\,{}^c_s) - V(i-1\,.\,i'\,.\,{}^c_s);$$

Ich habe den F, G etc. eine etwas andere Form als Hansen gegeben, was die Rechnung bequemer macht.

$i.-i'$	$F(i\,.\,i'\,.\,c)$	$F(i\,.\,i'\,.\,s)$	$G(i\,.\,i'\,.\,c)$	$G(i\,.\,i'\,.\,s)$	$H(i\,.\,i'\,.\,c)$	$H(i\,.\,i'\,.\,s)$	$T(i\,.\,i'\,.\,c)$	$T(i\,.\,i'\,.\,s)$
0. — 0		— 0.05406			— 14.50286	— 0.27211		—2.97812
1. — 0	+ 8.304	+ 0.280	—35.9774	+ 0.05406	+ 7.581	+ 3.283	+0.439	+0.347
2. — 0	— 5.982	— 2.657	+ 5.311	— 0.322	— 1.759	— 0.530	—0.498	+1.414
3. — 0	+ 1.220	+ 0.300	+ 0.160	+ 0.316	+ 0.383	+ 0.193	+0.062	—0.330
4. — 0	— 0.275	— 0.147	+ 0.096	+ 0.096	— 0.090	— 0.049	—0.030	+0.071
5. — 0	+ 0.065	+ 0.034	— 0.016	— 0.001	+ 0.020	+ 0.013	+0.007	—0.017
6. — 0	— 0.015	— 0.009	+ 0.003	+ 0.003	— 0.005	— 0.003	—0.002	+0.004
7. — 0	+ 0.004	+ 0.002	0.000	— 0.001	+ 0.001	0.000	+0.001	—0.001
8. — 0	0.000	0.000	— 0.001	+ 0.001	0.000	0.000	0.000	0.000
9. — 0	0.000	0.000	— 0.001	0.000	0.000	0.000	0.000	0.000
10. — 0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
— 8. — 1	0.000	0.000	0.000	0.000	+ 0.001	0.000	0.000	0.000
— 7. — 1	0.000	0.000	0.000	0.000	— 0.001	— 0.001	0.000	0.000
— 6. — 1	— 0.003	— 0.004	— 0.001	0.000	+ 0.002	+ 0.005	+0.001	—0.001
— 5. — 1	+ 0.014	+ 0.017	+ 0.005	+ 0.006	— 0.013	— 0.015	—0.006	+0.004
— 4. — 1	— 0.046	— 0.086	— 0.020	— 0.027	+ 0.050	+ 0.096	+0.028	—0.014
— 3. — 1	+ 0.162	+ 0.328	+ 0.072	+ 0.125	— 0.313	— 0.517	—0.118	+0.051
— 2. — 1	— 0.262	— 1.213	— 0.250	— 0.507	+ 0.828	+ 2.982	+0.431	—0.107
— 1. — 1	+ 0.814	+ 1.609	+ 0.623	+ 1.971	+ 0.171	—12.361	—0.797	+0.556
0. — 1	+ 0.331	+ 3.539	— 1.965	— 4.438	+ 4.221	+32.255	—0.680	—0.272
1. — 1	— 1 947	—18.662	— 0.761	+ 5.811	+ 2.600	—12.596	+1.880	—0.470
2. — 1	— 2.651	+ 9.831	— 1.748	— 6.923	— 2.054	+ 6.575	+0.045	+0.374
3. — 1	+ 1.676	— 5.532	+ 1.185	— 0.488	+ 0.272	— 1.158	—0.916	—0.123
4. — 1	— 0.166	+ 0.806	— 0.278	+ 0.910	— 0.129	+ 0.262	+0.165	+0.016
5. — 1	+ 0.106	— 0.205	— 0.022	+ 0.006	+ 0.025	— 0.062	—0.041	—0.017
6. — 1	— 0.017	+ 0.046	— 0.012	+ 0.013	— 0.009	+ 0.010	+0.010	+0.004
7. — 1	+ 0.007	— 0.006	— 0.002	— 0.002	+ 0.004	— 0.002	—0.002	—0.001
8. — 1	— 0.004	+ 0.002	0.000	— 0.002	— 0.001	+ 0.001	0.000	0.000
9. — 1	0.000	0.000	+ 0.001	0.000	0.000	0.000	0.000	0.000
10. — 1	0.000	0.000	+ 0.001	— 0.001	0.000	0.000	0.000	0.000
— 7. — 2	0.000	0.000	0.000	0.000	0.000	— 0.001	0.000	0.000
— 6. — 2	— 0.002	+ 0.004	0.000	0.000	+ 0.003	— 0.001	0.000	—0.001
— 5. — 2	+ 0.004	— 0.005	+ 0.002	— 0.004	— 0.011	+ 0.011	+0.001	+0.003
— 4. — 2	— 0.024	+ 0.012	— 0.007	+ 0.007	+ 0.049	— 0.037	—0.006	—0.009
— 3. — 2	+ 0.092	— 0.048	+ 0.040	— 0.024	— 0.327	+ 0.183	+0.026	+0.045
— 2. — 2	— 0.205	+ 0.101	— 0.153	+ 0.090	+ 2.101	— 0.991	—0.100	—0.180
— 1. — 2	— 0.238	+ 0.033	+ 0.471	— 0.257	— 12.768	+ 5.275	+0.358	+0.616
0. — 2	+ 8.113	— 2.828	— 0.969	+ 0.616	+ 58.182	—20.298	—0.984	—0.939
1. — 2	— 49.113	+18.285	— 1.838	— 0.202	—130.965	+53.018	—0.144	—0.925
2. — 2	+124.001	—50.664	+16.097	— 7.579	+ 8.742	+ 3.379	+1.119	+1.687
3. — 2	— 3.782	— 4.957	—36.014	+14.812	— 4.539	— 0.865	—0.235	+0.177
4. — 2	+ 4.139	+ 0.538	— 1.014	+ 2.307	+ 0.671	+ 0.125	—0.037	—0.533
5. — 2	— 0.444	— 0.096	— 0.957	— 0.013	— 0.178	— 0.079	—0.004	+0.079
6. — 2	+ 0.149	+ 0.065	— 0.005	+ 0.008	+ 0.042	+ 0.012	+0.007	—0.024
7. — 2	— 0.033	— 0.007	— 0.024	— 0.008	— 0.008	— 0.004	—0.002	+0.005
8. — 2	+ 0.006	+ 0.005	+ 0.004	— 0.002	+ 0.003	+ 0.001	+0.001	—0.001
9. — 2	— 0.003	0.000	0.000	— 0.001	0.000	0.000	0.000	0.000
10. — 2	0.000	0.000	+ 0.001	— 0.001	0.000	0.000	0.000	0.000
— 6. — 3	0.000	0.000	0.000	0.000	— 0.001	— 0.001	0.000	0.000
— 5. — 3	— 0.002	— 0.002	— 0.001	— 0.001	+ 0.005	+ 0.004	+0.001	—0.001
— 4. — 3	+ 0.004	+ 0.007	+ 0.003	+ 0.003	— 0.022	— 0.024	—0.004	+0.003
— 3. — 3	— 0.008	— 0.022	— 0.009	— 0.012	+ 0.097	+ 0.146	+0.016	—0.009
— 2. — 3	+ 0.006	+ 0.033	+ 0.027	+ 0.044	— 0.397	— 0.880	—0.066	+0.032
— 1. — 3	+ 0.093	+ 0.251	— 0.080	— 0.134	+ 1.038	+ 4.825	+0.224	—0.097
0. — 3	— 0.1968	— 3.0107	+ 0.2092	+ 0.2346	— 2.5036	—20.4699	—0.5241	+0.3066
1. — 3	+ 0.9400	+16.9117	— 0.6239	+ 0.5288	+ 11.2699	+58.4399	+0.2579	—0.6959
2. — 3	— 9.2694	—53.1180	+ 0.5452	— 5.9844	— 47.2280	—72.6440	+0.8379	—0.2503
3. — 3	+ 45.962	+68.842	+ 4.181	+17.592	— 4.153	+ 4.418	—0.796	+0.877
4. — 3	+ 5.588	— 1.754	—14.057	—20.603	— 0.019	— 2.993	—0.205	—0.086
5. — 3	+ 0.292	+ 2.787	— 2.365	— 0.518	— 0.071	+ 0.356	+0.283	—0.077
6. — 3	+ 0.083	— 0.221	— 0.209	— 0.711	+ 0.042	— 0.115	—0.036	—0.004

$i.-i'$	$F(i.i'.c)$	$F(i.i'.s)$	$G(i.i'.c)$	$G(i.i'.s)$	$H(i.i'.c)$	$H(i.i'.s)$	$T(i.i'.c)$	$T(i.i'.s)$
7.—3	— 0.034	+ 0.100	— 0.029	— 0.007	— 0.007	+ 0.022	+0.014	+0.003
8.—3	+ 0.005	— 0.016	+ 0.005	— 0.019	+ 0.002	— 0.005	—0.003	—0.001
9.—3	— 0.002	+ 0.004	+ 0.001	+ 0.001	0.000	0.000	+0.001	0.000
10.—3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11.—3	0.000	0.000	+ 0.001	— 0.001	0.000	0.000	0.000	0.000
— 5.—4	0.000	0.000	0.000	0.000	+ 0.003	— 0.003	0.000	0.000
— 4.—4	— 0.001	+ 0.001	0.000	— 0.001	— 0.011	+ 0.011	+0.001	+0.001
— 3.—4	— 0.002	+ 0.003	— 0.001	+ 0.001	+ 0.056	— 0.035	—0.004	—0.006
— 2.—4	+ 0.002	— 0.003	+ 0.010	— 0.012	— 0.309	+ 0.133	+0.011	+0.022
— 1.—4	+ 0.109	— 0.020	— 0.039	+ 0.031	+ 1.512	— 0.374	—0.034	—0.072
0.—4	— 0.911	+ 0.068	+ 0.067	— 0.084	— 6.257	+ 0.937	+0.103	+0.193
1.—4	+ 4.842	— 0.185	+ 0.112	+ 0.228	+20.229	— 3.252	—0.297	—0.315
2.—4	—17.819	+ 1.973	— 1.547	— 0.490	—44.128	+15.677	+0.399	—0.066
3.—4	+41.211	—14.113	+ 6.554	— 0.386	+35.147	—33.873	+0.329	+0.571
4.—4	—33.000	+32.977	—13.581	+ 5.409	— 2.779	— 3.788	—0.582	—0.298
5.—4	+ 1.496	+ 4.831	+ 9.936	—10.205	+ 1.794	— 0.421	+0.001	—0.159
6.—4	— 1.664	+ 0.603	+ 0.008	— 1.950	— 0.179	— 0.057	+0.069	+0.139
7.—4	+ 0.104	+ 0.086	+ 0.436	— 0.250	+ 0.076	+ 0.025	+0.005	—0.017
8.—4	— 0.068	— 0.023	+ 0.007	— 0.043	— 0.013	— 0.004	—0.001	+0.008
9.—4	+ 0.010	+ 0.004	+ 0.015	+ 0.008	0.000	+ 0.003	0.000	—0.002
10.—4	+ 0.001	— 0.003	0.000	— 0.001	0.000	0.000	0.000	+0.001
11.—4	0.000	0.000	— 0.002	+ 0.001	0.000	0.000	0.000	0.000
— 5.—5	0.000	0.000	0.000	0.000	— 0.001	— 0.001	0.000	0.000
— 4.—5	0.000	0.000	0.000	0.000	+ 0.004	+ 0.004	0.000	0.000
— 3.—5	0.000	+ 0.001	+ 0.001	+ 0.001	— 0.015	— 0.022	—0.002	+0.001
— 2.—5	+ 0.002	+ 0.003	— 0.003	— 0.003	+ 0.053	+ 0.108	+0.007	—0.004
— 1.—5	— 0.011	— 0.043	+ 0.010	+ 0.010	— 0.160	— 0.501	—0.024	+0.013
0.—5	+ 0.043	+ 0.300	— 0.028	— 0.019	+ 0.428	+ 2.029	+0.069	—0.037
1.—5	— 0.1314	— 1.5072	+ 0.0768	— 0.0326	— 1.2371	— 6.8210	—0.1458	+0.1038
2.—5	+ 0.5937	+ 5.7881	— 0.1764	+ 0.4346	+ 4.6126	+17.6808	+0.1411	—0.2378
3.—5	— 3.6070	—16.1595	+ 0.1517	— 2.0961	—16.0233	—28.5650	+0.1726	+0.1754
4.—5	+14.933	+26.989	+ 1.248	+ 5.896	+21.248	+15.000	—0.328	+0.308
5.—5	—20.593	—13.790	— 5.377	— 8.804	+ 2.821	— 2.104	+0.068	—0.340
6.—5	— 3.477	+ 1.542	+ 6.378	+ 4.109	+ 0.506	+ 0.970	+0.101	—0.032
7.—5	— 0.630	— 0.876	+ 1.359	— 0.288	+ 0.069	— 0.095	—0.064	+0.047
8.—5	— 0.098	+ 0.056	+ 0.239	+ 0.224	— 0.006	+ 0.047	+0.009	+0.004
9.—5	+ 0.001	— 0.043	+ 0.046	+ 0.003	+ 0.002	— 0.008	—0.005	0.000
10.—5	— 0.002	+ 0.007	+ 0.001	+ 0.011	0.000	+ 0.002	+0.001	0.000
11.—5	— 0.001	— 0.002	+ 0.001	— 0.003	0.000	0.000	0.000	0.000
12.—5	0.000	0.000	+ 0.001	0.000	0.000	0.000	0.000	0.000
— 4.—6	0.000	0.000	0.000	0.000	+ 0.002	— 0.001	0.000	0.000
— 3.—6	— 0.002	0.000	0.000	0.000	— 0.007	+ 0.005	+0.001	+0.001
— 2.—6	+ 0.001	— 0.002	+ 0.001	+ 0.001	+ 0.037	— 0.017	—0.001	—0.003
— 1.—6	— 0.015	+ 0.004	+ 0.003	— 0.002	— 0.163	+ 0.065	+0.004	+0.007
0.—6	+ 0.095	— 0.021	— 0.007	+ 0.008	+ 0.662	— 0.178	—0.013	—0.023
1.—6	— 0.480	+ 0.060	— 0.007	— 0.026	— 2.284	+ 0.484	+0.038	+0.057
2.—6	+ 1.875	— 0.216	+ 0.129	+ 0.068	+ 6.417	— 1.570	—0.096	—0.091
3.—6	— 5.715	+ 1.050	— 0.650	— 0.096	—13.515	+ 5.452	+0.162	+0.029
4.—6	+12.614	— 4.711	+ 2.141	— 0.184	+16.368	—13.511	—0.039	+0.165
5.—6	—15.526	+12.793	— 4.529	+ 1.736	— 5.520	+12.051	—0.240	—0.155
6.—6	+ 4.868	—11.580	+ 4.999	— 4.460	+ 1.665	— 1.782	+0.178	—0.019
7.—6	— 1.446	— 2.165	— 1.411	+ 3.565	— 0.450	+ 0.432	+0.037	+0.056
8.—6	+ 0.381	— 0.508	+ 0.386	— 0.839	+ 0.064	— 0.050	—0.029	—0.027
9.—6	— 0.049	— 0.068	— 0.087	+ 0.186	— 0.026	+ 0.004	—0.002	+0.005
10.—6	+ 0.024	— 0.007	+ 0.010	— 0.028	+ 0.005	0.000	0.000	—0.002
11.—6	— 0.004	+ 0.001	— 0.006	+ 0.003	— 0.004	0.000	0.000	0.000
12.—6	— 0.003	0.000	+ 0.001	— 0.001	0.000	0.000	0.000	0.000
13.—6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
— 3.—7	0.000	0.000	0.000	0.000	+ 0.003	+ 0.003	0.000	0.000
— 2.—7	— 0.001	— 0.002	0.000	0.000	— 0.008	— 0.013	—0.001	+0.001

$i.-i'$	$F(i.i'.c)$	$F(i.i'.s)$	$G(i.i'.c)$	$G(i.i'.s)$	$H(i.i'.c)$	$H(i.i'.s)$	$T(i.i'.c)$	$T(i.i'.s)$
− 1. − 7	+0.003	+0.006	−0.001	0.000	+0.021	+0.057	+0.003	−0.001
0. − 7	−0.006	−0.037	+0.003	+0.001	−0.066	−0.222	−0.008	+0.004
1. − 7	+0.023	+0.161	−0.009	+0.007	+0.191	+0.754	+0.021	−0.014
2. − 7	−0.084	−0.603	+0.025	−0.043	−0.572	−2.240	−0.041	+0.037
3. − 7	+0.340	+1.940	−0.043	+0.201	+1.866	+5.377	+0.047	−0.077
4. − 7	−1.459	−4.930	−0.002	−0.716	−5.423	−9.246	+0.022	+0.094
5. − 7	+4.902	+8.748	+0.438	+1.856	+9.964	+8.351	−0.121	+0.025
6. − 7	−9.504	−7.905	−1.803	−3.093	−6.278	−1.606	+0.058	−0.164
7. − 7	+5.952	+1.270	+3.244	+2.501	−0.974	+1.250	+0.039	+0.083
8. − 7	+1.171	−1.175	−1.808	−0.336	−0.306	−0.165	−0.028	+0.030
9. − 7	+0.345	+0.117	−0.445	+0.349	−0.035	+0.041	+0.010	−0.015
10. − 7	+0.047	−0.036	−0.122	−0.017	−0.007	−0.011	−0.002	−0.002
11. − 7	+0.010	+0.010	−0.019	+0.008	−0.001	+0.005	+0.001	−0.001
12. − 7	+0.003	−0.007	−0.005	−0.002	0.000	+0.002	0.000	0.000
13. − 7	0.000	−0.003	−0.002	+0.004	0.000	0.000	0.000	0.000
− 4. − 8	0.000	0.000	0.000	0.000	0.000	+0.001	0.000	0.000
− 3. − 8	0.000	−0.001	0.000	0.000	+0.001	−0.001	0.000	0.000
− 2. − 8	0.000	0.000	0.000	0.000	−0.004	+0.002	0.000	0.000
− 1. − 8	+0.002	0.000	0.000	+0.001	+0.018	−0.009	0.000	−0.001
0. − 8	−0.011	+0.003	0.000	−0.002	−0.071	+0.026	+0.002	+0.003
1. − 8	+0.050	−0.010	+0.001	+0.003	+0.249	−0.074	−0.005	−0.007
2. − 8	−0.19433	+0.03297	−0.01202	−0.00735	−0.76864	+0.21483	+0.01332	+0.01640
3. − 8	+0.65052	−0.12021	+0.06186	+0.01619	+1.99844	−0.66313	−0.03135	−0.02604
4. − 8	−1.79409	+0.47312	−0.23515	−0.01176	−4.09549	+1.97899	+0.05589	+0.01573
5. − 8	+3.825	−1.678	+0.681	−0.098	+5.718	−4.722	−0.045	+0.037
6. − 8	−5.444	+4.373	−1.429	+0.577	−3.730	+6.643	−0.046	−0.072
7. − 8	+3.499	−6.350	+1.882	−1.586	+0.257	−3.027	+0.101	+0.010
8. − 8	−0.100	+2.814	−1.078	+2.128	−0.877	−0.453	−0.033	+0.032
9. − 8	+0.860	+0.551	+0.006	−0.837	+0.035	−0.189	−0.020	−0.011
10. − 8	−0.002	+0.207	−0.273	−0.213	−0.031	−0.027	+0.008	+0.005
11. − 8	+0.030	+0.034	−0.012	−0.071	+0.007	−0.004	+0.001	−0.002
12. − 8	−0.005	+0.004	−0.008	−0.014	−0.001	+0.003	0.000	0.000
13. − 8	+0.001	−0.004	+0.001	−0.001	−0.001	0.000	0.000	0.000
14. − 8	+0.001	−0.001	0.000	+0.003	0.000	0.000	0.000	0.000
15. − 8	0.000	0.000	−0.001	+0.001	0.000	0.000	0.000	0.000
− 1. − 9	0.000	0.000	0.000	0.000	−0.004	−0.004	0.000	0.000
0. − 9	+0.001	+0.002	0.000	0.000	+0.009	+0.021	+0.001	0.000
1. − 9	−0.003	−0.014	+0.002	0.000	−0.028	−0.080	−0.003	+0.001
2. − 9	+0.015	+0.060	−0.003	+0.002	+0.081	+0.257	+0.005	−0.005
3. − 9	−0.044	−0.211	+0.003	−0.017	−0.241	−0.714	−0.012	+0.013
4. − 9	+0.159	+0.626	−0.007	+0.072	+0.717	+1.639	+0.015	−0.025
5. − 9	−0.572	−1.509	−0.019	−0.233	−1.889	−2.866	+0.001	+0.037
6. − 9	+1.678	+2.713	+0.172	+0.578	+3.703	+3.205	−0.035	−0.015
7. − 9	−3.476	−3.068	−0.605	−1.001	−4.084	−1.376	+0.036	−0.045
8. − 9	+3.901	+1.257	+1.242	+1.043	+1.370	−0.084	+0.009	+0.057
9. − 9	−1.242	+0.151	−1.290	−0.364	+0.157	−0.558	−0.021	−0.010
10. − 9	−0.200	+0.554	+0.361	−0.056	+0.102	−0.040	+0.004	−0.013
11. − 9	−0.110	+0.074	+0.079	−0.173	+0.018	+0.022	−0.001	+0.004
12. − 9	−0.020	−0.042	+0.038	−0.047	+0.006	+0.012	+0.001	+0.001
13. − 9	−0.008	−0.021	+0.006	+0.036	+0.001	0.000	0.000	0.000
14. − 9	−0.003	−0.004	+0.003	+0.014	0.000	0.000	0.000	0.000
15. − 9	0.000	0.000	+0.002	+0.004	0.000	0.000	0.000	0.000
0. − 10	0.000	0.000	0.000	0.000	+0.004	−0.004	0.000	0.000
1. − 10	−0.002	+0.001	0.000	0.000	−0.025	+0.009	+0.001	+0.001
2. − 10	+0.020	−0.003	0.000	+0.002	+0.080	−0.029	−0.001	−0.002
3. − 10	−0.068	+0.014	−0.007	−0.003	−0.248	+0.089	+0.003	+0.004
4. − 10	+0.215	−0.058	+0.021	+0.005	+0.616	−0.256	−0.011	−0.007
5. − 10	−0.559	+0.189	−0.081	+0.005	−1.234	+0.706	+0.020	+0.006
6. − 10	+1.154	−0.595	+0.215	−0.043	+1.822	−1.631	−0.021	+0.007
7. − 10	−1.740	+1.486	−0.439	+0.198	−1.582	+2.657	−0.001	−0.025
8. − 10	+1.511	−2.513	+0.631	−0.539	+0.327	−2.331	+0.035	+0.014

$i.-i'$	$F(i.i',c)$	$F(i.i',s)$	$G(i.i',c)$	$G(i.i',s)$	$H(i.i',c)$	$H(i.i',s)$	$T(i.i',c)$	$T(i.i',s)$
9. — 10	−0.274	+2.217	−0.496	+0.884	+0.103	+0.527	−0.029	+0.013
10. — 10	−0.128	−0.426	+0.065	−0.719	+0.328	+0.204	0.000	−0.011
11. — 10	−0.328	−0.323	+0.040	+0.075	+0.030	−0.367	+0.006	0.000
12. — 10	−0.044	+0.556	+0.103	+0.246	+0.015	−0.087	−0.002	−0.001
13. — 10	−0.016	+0.189	+0.020	−0.384	0.000	−0.008	0.000	+0.001
14. — 10	+0.001	+0.029	+0.005	−0.139	−0.001	−0.002	0.000	0.000
15. — 10	+0.002	+0.005	−0.001	−0.021	0.000	+0.001	0.000	0.000
16. — 10	0.000	−0.001	−0.003	−0.003	0.000	0.000	0.000	0.000
1. — 11	0.000	0.000	0.000	0.000	+0.004	+0.007	0.000	0.000
2. — 11	−0.001	−0.005	0.000	0.000	−0.009	−0.027	−0.001	+0.001
3. — 11	+0.003	+0.020	−0.002	+0.001	+0.026	+0.075	+0.001	−0.001
4. — 11	−0.018	−0.063	+0.003	−0.005	−0.086	−0.208	−0.003	+0.003
5. — 11	+0.062	+0.186	+0.003	+0.022	+0.243	+0.466	+0.004	−0.008
6. — 11	−0.192	−0.432	−0.012	−0.073	−0.614	−0.842	−0.001	+0.014
7. — 11	+0.536	+0.797	+0.054	+0.169	+1.259	+1.070	−0.008	−0.010
8. — 11	−1.168	−1.028	−0.187	−0.302	−1.770	−0.725	+0.016	−0.007
9. — 11	+1.681	+0.708	+0.427	+0.368	+1.311	+0.114	−0.004	+0.021
10. — 11	−1.240	−0.186	−0.587	−0.250	−0.265	−0.608	−0.011	−0.014
11. — 11	+0.221	+0.963	+0.399	+0.191	+0.045	+1.670	+0.006	−0.001
12. — 11	−0.039	−2.349	−0.059	−0.798	−0.019	+0.361	+0.001	+0.003
13. — 11	+0.014	−0.739	+0.012	+1.491	−0.002	+0.040	+0.001	−0.001
14. — 11	+0.001	−0.117	−0.001	+0.522	−0.002	0.000	−0.001	0.000
15. — 11	+0.003	−0.009	0.000	+0.081	−0.002	−0.002	0.000	0.000
16. — 11	+0.003	+0.001	−0.002	+0.007	0.000	0.000	0.000	0.000
17. — 11	0.000	0.000	−0.002	0.000	0.000	0.000	0.000	0.000
2. — 12	−0.001	0.000	0.000	0.000	−0.010	+0.004	0.000	0.000
3. — 12	+0.009	−0.001	+0.001	0.000	+0.030	−0.011	−0.001	−0.001
4. — 12	−0.027	+0.004	−0.004	−0.002	−0.074	+0.036	+0.001	+0.001
5. — 12	+0.065	−0.027	+0.011	+0.003	+0.187	−0.096	−0.003	−0.001
6. — 12	−0.170	+0.073	−0.026	+0.006	−0.373	+0.245	+0.007	+0.002
7. — 12	+0.351	−0.203	+0.066	−0.018	+0.561	−0.547	−0.008	+0.001
8. — 12	−0.539	+0.488	−0.137	+0.062	−0.561	+0.954	+0.003	−0.008
9. — 12	+0.544	−0.887	+0.204	−0.170	+0.199	−1.056	+0.008	+0.008
10. — 12	−0.187	+0.970	−0.190	+0.310	+0.145	+0.415	−0.014	+0.002
11. — 12	−0.156	−0.260	+0.052	−0.286	−0.009	+0.302	+0.005	−0.008
12. — 12	+0.009	−0.497	+0.059	−0.069	−0.094	+0.162	+0.003	+0.003
13. — 12	+0.094	−0.276	−0.001	+0.354	−0.019	+0.012	−0.001	+0.001
14. — 12	+0.024	−0.041	−0.029	+0.181	−0.005	+0.006	0.000	0.000
15. — 12	+0.005	−0.012	−0.011	+0.030	0.000	−0.001	0.000	0.000
16. — 12	+0.003	+0.002	−0.001	+0.008	0.000	−0.002	0.000	0.000
17. — 12	0.000	+0.003	−0.003	−0.002	0.000	0.000	0.000	0.000
18. — 12	0.000	0.000	0.000	−0.002	0.000	0.000	0.000	0.000
3. — 13	0.000	−0.001	0.000	0.000	−0.004	−0.010	0.000	0.000
4. — 13	+0.001	+0.009	0.000	+0.001	+0.013	+0.029	+0.001	−0.001
5. — 13	−0.007	−0.025	+0.002	−0.004	−0.032	−0.065	−0.001	+0.001
6. — 13	+0.023	+0.058	−0.001	+0.009	+0.088	+0.144	0.000	−0.003
7. — 13	−0.070	−0.135	−0.003	−0.022	−0.223	−0.256	0.000	+0.005
8. — 13	+0.194	+0.243	+0.019	+0.053	+0.440	+0.341	−0.002	−0.005
9. — 13	−0.402	−0.332	−0.067	−0.094	−0.659	−0.247	+0.004	0.000
10. — 13	+0.608	+0.237	+0.141	+0.124	+0.598	−0.038	−0.003	+0.007
11. — 13	−0.539	+0.063	−0.199	−0.074	−0.216	+0.189	−0.002	−0.008
12. — 13	+0.153	−0.217	+0.146	−0.054	−0.059	+0.031	+0.005	+0.003
13. — 13	+0.109	−0.054	+0.009	+0.101	+0.028	−0.040	−0.001	+0.002
14. — 13	−0.047	+0.036	−0.089	+0.036	−0.027	−0.012	−0.001	−0.002
15. — 13	+0.036	+0.014	+0.042	−0.009	+0.006	−0.001	0.000	0.000
16. — 13	−0.008	+0.002	−0.024	−0.006	−0.003	−0.002	0.000	0.000
17. — 13	+0.004	+0.003	+0.006	0.000	0.000	0.000	0.000	+0.001
18. — 13	0.000	0.000	−0.002	−0.002	0.000	0.000	0.000	0.000
3. — 14	0.000	0.000	0.000	0.000	−0.002	0.000	0.000	0.000
4. — 14	+0.001	0.000	0.000	0.000	+0.010	−0.004	0.000	0.000

$i.-i'$	$F(i.i'.c)$	$F(i.i'.s)$	$G(i.i'.c)$	$G(i.i'.s)$	$H(i.i'.c)$	$H(i.i'.s)$	$T(i.i'.c)$	$T(i.i'.s)$
5. — 14	−0.009	+0.001	+0.001	0.000	−0.027	+0.010	+0.001	+0.001
6. — 14	+0.024	−0.003	+0.003	+0.002	+0.052	−0.024	−0.001	−0.001
7. — 14	−0.048	+0.013	−0.009	−0.004	−0.108	+0.072	+0.001	0.000
8. — 14	+0.101	−0.052	+0.020	+0.003	+0.172	−0.193	−0.002	+0.001
9. — 14	−0.167	+0.175	−0.039	+0.010	−0.181	+0.336	+0.002	−0.002
10. — 14	+0.176	−0.313	+0.065	−0.063	+0.086	−0.445	+0.001	+0.003
11. — 14	−0.084	+0.421	−0.063	+0.113	+0.071	+0.368	−0.005	−0.001
12. — 14	−0.069	−0.352	+0.025	−0.148	−0.081	−0.137	+0.003	−0.003
13. — 14	+0.081	+0.125	+0.025	+0.120	−0.019	+0.019	+0.001	+0.002
14. — 14	+0.024	−0.012	−0.026	−0.038	+0.015	−0.021	−0.001	0.000
15. — 14	−0.013	+0.021	−0.012	+0.001	+0.008	−0.003	0.000	0.000
16. — 14	−0.010	+0.003	+0.002	−0.006	+0.003	+0.002	0.000	0.000
17. — 14	−0.003	−0.003	+0.005	−0.001	0.000	+0.001	0.000	0.000
18. — 14	0.000	0.000	0.000	+0.002	0.000	0.000	0.000	0.000
19. — 14	0.000	0.000	0.000	−0.001	0.000	0.000	0.000	0.000
4. — 15	0.000	0.000	0.000	0.000	0.000	−0.003	0.000	0.000
5. — 15	0.000	+0.001	0.000	0.000	+0.004	+0.009	0.000	0.000
6. — 15	−0.001	−0.006	0.000	+0.001	−0.011	−0.024	−0.001	0.000
7. — 15	+0.006	+0.019	−0.002	0.000	+0.032	+0.050	+0.001	−0.001
8. — 15	−0.028	−0.043	+0.001	−0.003	−0.081	−0.082	0.000	+0.002
9. — 15	+0.074	+0.069	+0.010	+0.013	+0.153	+0.108	−0.001	−0.001
10. — 15	−0.139	−0.093	−0.028	−0.017	−0.238	−0.089	+0.002	0.000
11. — 15	+0.220	+0.081	+0.050	+0.023	+0.277	+0.006	−0.001	+0.001
12. — 15	−0.261	−0.004	−0.076	−0.021	−0.189	+0.081	0.000	−0.002
13. — 15	+0.177	−0.078	+0.089	−0.004	+0.061	−0.057	+0.001	+0.002
14. — 15	−0.055	+0.050	−0.057	+0.027	−0.014	−0.006	−0.001	0.000
15. — 15	+0.012	+0.011	+0.017	−0.011	+0.014	+0.002	0.000	−0.001
16. — 15	−0.015	−0.004	−0.004	−0.008	+0.003	0.000	0.000	0.000
17. — 15	−0.005	0.000	+0.006	+0.003	+0.001	−0.001	0.000	0.000
18. — 15	−0.003	0.000	+0.002	0.000	0.000	0.000	0.000	0.000
19. — 15	0.000	0.000	+0.002	+0.001	0.000	0.000	0.000	0.000
5. — 16	0.000	0.000	0.000	0.000	+0.001	−0.00	0.000	0.000
6. — 16	−0.001	0.000	0.000	0.000	−0.008	+0.004	0.000	0.000
7. — 16	+0.008	−0.002	0.000	+0.001	+0.020	−0.011	0.000	0.000
8. — 16	−0.025	+0.009	−0.003	−0.001	−0.036	+0.027	+0.001	0.000
9. — 16	+0.040	−0.024	+0.015	−0.002	+0.047	−0.063	−0.001	0.000
10. — 16	−0.052	+0.061	−0.022	+0.009	−0.055	+0.112	+0.001	−0.001
11. — 16	+0.066	−0.107	+0.027	−0.026	+0.016	−0.164	0.000	+0.001
12. — 16	−0.023	+0.162	−0.036	+0.043	+0.042	+0.149	−0.001	0.000
13. — 16	−0.036	−0.146	+0.013	−0.063	−0.074	−0.066	+0.001	0.000
14. — 16	+0.070	+0.066	+0.010	+0.055	+0.030	+0.001	−0.001	+0.001
15. — 16	−0.028	+0.001	−0.022	−0.025	+0.014	+0.001	0.000	−0.001
16. — 16	−0.012	+0.001	+0.007	−0.001	0.000	+0.008	0.000	0.000
17. — 16	−0.004	−0.009	+0.001	−0.002	+0.002	+0.005	0.000	0.000
18. — 16	−0.003	−0.008	+0.005	+0.003	−0.001	+0.004	0.000	0.000
19. — 16	0.000	−0.009	+0.002	+0.005	0.000	−0.001	0.000	0.000
20. — 16	0.000	+0.001	+0.001	+0.007	0.000	0.000	0.000	0.000

$i.-i'$	$U(i.i'.c)$	$U(i.i'.s)$	$V(i.i'.c)$	$V(i.i'.s)$	$i.-i'$	$U(i.i'.c)$	$U(i.i'.s)$	$V(i.i'.c)$	$V(i.i'.s)$
0. — 0			−3.17942	+7.49469	− 8. — 1	0.000	0.000	0.000	+0.001
1. — 0	−3.09464	+1.489	+0.883	−3.237	− 7. — 1	0.000	0.000	+0.001	−0.001
2. — 0	+2.740	−7.842	−0.231	+0.723	− 6. — 1	0.000	−0.001	−0.007	+0.005
3. — 0	−0.384	+1.823	+0.073	−0.164	− 5. — 1	−0.002	+0.002	+0.034	−0.021
4. — 0	+0.169	−0.394	−0.019	+0.037	− 4. — 1	+0.013	−0.009	−0.157	+0.080
5. — 0	−0.043	+0.093	+0.005	−0.008	− 3. — 1	−0.062	+0.035	+0.656	−0.291
6. — 0	+0.012	−0.020	−0.001	+0.002	− 2. — 1	+0.275	−0.131	−2.447	+0.669
7. — 0	−0.003	+0.005	0.000	0.000	− 1. — 1	−1.087	+0.398	+5.099	−3.196

$i.-i'$	$U(i.i'.c)$	$U(i.i'.s)$	$V(i.i'.c)$	$V(i.i'.s)$	$i.-i'$	$U(i.i'.c)$	$U(i.i'.s)$	$V(i.i'.c)$	$V(i.i'.s)$
0. — 1	+3.244	—1.225	+0.186	+2.599	— 5. — 5	0.000	0.000	0.000	—0.001
1. — 1	—4.419	+3.468	—5 044	—1.106	— 4. — 5	0.000	0.000	—0.002	+0.002
2. — 1	—2.066	—2.129	+1.848	+0.236	— 3. — 5	—0.001	+0.001	+0.010	—0.007
3. — 1	+4.999	+0.732	—0.392	—0.106	— 2. — 5	+0.004	—0.003	—0.039	+0.024
4. — 1	—0.932	—0.113	+0.095	+0.037	— 1. — 5	—0.017	+0.011	+0.138	—0.074
5. — 1	+0.227	+0.090	—0.020	—0.010	0. — 5	+0.063	—0.036	—0.409	+0.223
6. — 1	—0.054	—0.020	+0.005	+0.003	1. — 5	—0.2066	+0.1113	+0.9400	—0.6339
7. — 1	+0.010	+0.006	—0.001	—0.001	2. — 5	+0.5551	—0.3270	—1.2654	+1.5241
8. — 1	—0.003	—0.002	0.000	0.000	3. — 5	—1.0812	+0.8717	+0.2133	—1.7539
9. — 1	+0.001	+0.001	0.000	0.000	4. — 5	+1.093	—1.700	+0.559	+0.150
					5. — 5	+0.115	+1.446	—0.456	+0.266
— 7. — 2	0.000	0.000	—0.001	—0.001	6. — 5	—0.627	+0.191	+0.119	—0.028
— 6. — 2	0.000	0.000	+0.003	+0.003	7. — 5	+0.355	—0.234	—0.034	—0.002
— 5. — 2	+0.001	+0.002	—0.009	—0.014	8. — 5	—0.056	—0.019	+0.009	0.000
— 4. — 2	—0.004	—0.006	+0.035	+0.058	9. — 5	+0.025	—0.001	—0.002	—0.001
— 3. — 2	+0.015	+0.023	—0.138	—0.252	10. — 5	—0.004	—0.001	+0.001	0.000
— 2. — 2	—0.061	—0.103	+0.557	+1.007	11. — 5	+0.001	0.000	0.000	0.000
— 1. — 2	+0.238	+0.432	—2.041	—3.535					
0. — 2	—0.915	—1.623	+5.873	+6.348	— 4. — 6	0.000	0.000	+0.001	0.000
1. — 2	+3.025	+4.474	—2.303	+0.185	— 3. — 6	0.000	0.000	—0.003	—0.004
2. — 2	—5.729	—5.423	+0.095	—3.072	— 2. — 6	—0.002	—0.001	+0.010	+0.013
3. — 2	+1.184	—1.872	0.000	+0.981	— 1. — 6	+0.004	+0.007	—0.028	—0.046
4. — 2	+0.140	+2.895	+0.048	—0.212	0. — 6	—0.014	—0.020	+0.080	+0.139
5. — 2	+0.037	—0.448	—0.016	+0.053	1. — 6	+0.041	+0.069	—0.230	—0.356
6. — 2	—0.044	+0.133	+0.005	—0.012	2. — 6	—0.118	—0.196	+0.597	+0.660
7. — 2	+0.009	—0.029	—0.002	+0.002	3. — 6	+0.326	+0.447	—1.143	—0.605
8. — 2	—0.003	+0.007	0.000	0.000	4. — 6	—0.759	—0.689	+0.958	—0.147
9. — 2	+0.001	—0.001	0.000	0.000	5. — 6	+1.182	+0.440	+0.024	+0.356
					6. — 6	—0.718	+0.302	—0.179	—0.212
— 6. — 3	0.000	0.000	+0.001	—0.001	7. — 6	—0.202	—0.337	+0.015	+0.058
— 5. — 3	0.000	—0.001	—0.004	+0.004	8. — 6	+0.142	+0.156	—0.001	—0.018
— 4. — 3	—0.002	+0.002	+0.020	—0.014	9. — 6	+0.014	—0.031	0.000	+0.004
— 3. — 3	+0.008	—0.006	—0.089	+0.052	10. — 6	+0.003	+0.013	0.000	—0.001
— 2. — 3	—0.036	+0.023	+0.368	—0.183	11. — 6	0.000	—0.002	0.000	+0.001
— 1. — 3	+0.155	—0.084	—1.281	+0.572	12. — 6	0.000	+0.001	0.000	0.000
0. — 3	—0.5921	+0.2798	+3.2300	—1.8226	13. — 6	0.000	—0.001	0.000	0.000
1. — 3	+1.8046	—0.8790	—3.1027	+4.3813					
2. — 3	—3.4879	+2.5184	—0.7291	—1.2589	— 3. — 7	0.000	0.000	—0.001	+0.001
3. — 3	+2.265	—4.131	+1.743	—0.281	— 2. — 7	0.000	0.000	+0.004	—0.004
4. — 3	+1.525	+0.382	—0.495	+0.052	— 1. — 7	+0.002	—0.002	—0.014	+0.010
5. — 3	—1.539	+0.368	+0.114	+0.022	0. — 7	—0.007	+0.005	+0.048	—0.029
6. — 3	+0.213	+0.025	—0.030	—0.007	1. — 7	+0.022	—0.014	—0.129	+0.083
7. — 3	—0.078	—0.018	+0.007	+0.002	2. — 7	—0.069	+0.043	+0.276	—0.222
8. — 3	+0.016	+0.004	—0.002	—0.001	3. — 7	+0.170	—0.120	—0.404	+0.507
9. — 3	—0.004	—0.002	+0.001	0.000	4. — 7	—0.323	+0.299	+0.216	—0.776
10. — 3	+0.001	0.000	0.000	0.000	5. — 7	+0.382	—0.601	+0.223	+0.475
					6. — 7	—0.095	+0.751	—0.200	+0.075
— 5. — 4	0.000	0.000	+0.001	+0.001	7. — 7	—0.281	—0.311	+0.088	—0.107
— 4. — 4	0.000	0.000	—0.005	—0.007	8. — 7	+0.161	—0.158	—0.021	+0.007
— 3. — 4	—0.002	—0.002	+0.018	+0.028	9. — 7	—0.060	+0.077	+0.010	—0.001
— 2. — 4	+0.009	+0.013	—0.064	—0.120	10. — 7	+0.011	+0.008	—0.003	—0.001
— 1. — 4	—0.029	—0.050	+0.203	+0.417	11. — 7	—0.008	+0.003	+0.001	0.000
0. — 4	+0.098	+0.192	—0.613	—1.171	12. — 7	+0.002	+0.002	0.000	0.000
1. — 4	—0.306	—0.610	+1.801	+2.199	13. — 7	—0.001	0.000	0.000	0.000
2. — 4	+0.910	+1.486	—2.920	—1.155					
3. — 4	—2.200	—2.133	+0.541	—0.745	— 4. — 8	0.000	0.000	0.000	0.000
4. — 4	+2.591	+0.584	+0.333	+0.321	— 3. — 8	0.000	0.000	0.000	0.000
5. — 4	+0.041	+1.043	—0.046	—0.245	— 2. — 8	0.000	0.000	—0.001	—0.001
6. — 4	—0.334	—0.762	—0.008	+0.062	— 1. — 8	—0.001	—0.001	+0.004	+0.005
7. — 4	—0.023	+0.106	+0.002	—0.017	0. — 8	+0.002	+0.002	—0.010	—0.016
8. — 4	+0.003	—0.045	—0.001	+0.004	1. — 8	—0.005	—0.008	+0.030	+0.045
9. — 4	—0.001	+0.009	0.000	—0.001	2. — 8	+0.01540	+0.02322	—0.08239	—0.10630
10. — 4	+0.001	—0.002	0.000	0.000	3. — 8	—0.04352	—0.06140	+0.20131	+0.19247
					4. — 8	+0.11374	+0.13234	—0.39436	—0.21218

$i.-i'$	$U(i.i'.c)$	$U(i.i'.s)$	$V(i.i'.c)$	$V(i.i'.s)$
5. — 8	−0.257	−0.208	+0.484	+0.020
6. — 8	+0.439	+0.175	−0.207	+0.189
7. — 8	−0.437	+0.052	−0.072	−0.102
8. — 8	+0.106	−0.199	+0.060	+0.037
9. — 8	+0.105	+0.070	−0.004	−0.017
10. — 8	−0.040	−0.027	+0.001	+0.005
11. — 8	−0.004	+0.012	0.000	−0.001
12. — 8	−0.002	−0.003	0.000	0.000
13. — 8	0.000	+0.001	0.000	0.000
14. — 8	0.000	0.000	0.000	0.000
15. — 8	0.000	0.000	0.000	0.000
— 1. — 9	0.000	0.000	+0.002	−0.001
0. — 9	0.000	0.009	−0.006	+0.003
1. — 9	−0.003	+0.001	+0.016	−0.010
2. — 9	+0.009	−0.004	−0.039	+0.029
3. — 9	−0.021	+0.015	+0.079	−0.077
4. — 9	+0.051	−0.042	−0.120	+0.170
5. — 9	−0.094	+0.102	+0.089	−0.284
6. — 9	+0.119	−0.207	+0.055	+0.280
7. — 9	−0.054	+0.299	−0.131	−0.076
8. — 9	−0.091	−0.235	+0.046	−0.053
9. — 9	+0.122	+0.019	−0.015	+0.032
10. — 9	−0.025	+0.063	+0.009	−0.002
11. — 9	+0.011	−0.019	−0.003	+0.001
12. — 9	−0.008	−0.002	+0.001	0.000
13. — 9	+0.002	−0.002	0.000	0.000
14. — 9	−0.001	0.000	0.000	0.000
15. — 9	0.000	0.000	0.000	0.000
0. — 10	0.000	0.000	+0.001	+0.002
1. — 10	0.000	0.000	−0.004	−0.005
2. — 10	−0.002	−0.003	+0.009	+0.014
3. — 10	+0.005	+0.007	−0.023	−0.030
4. — 10	−0.012	−0.018	+0.068	+0.054
5. — 10	+0.034	+0.037	−0.133	−0.066
6. — 10	−0.088	−0.060	+0.189	+0.020
7. — 10	+0.154	+0.059	−0.147	+0.068
8. — 10	−0.188	+0.005	+0.017	−0.079
9. — 10	+0.112	−0.082	+0.035	+0.017
10. — 10	+0.012	+0.066	−0.015	−0.005
11. — 10	−0.035	−0.006	+0.001	+0.005
12. — 10	+0.009	+0.005	−0.001	−0.002
13. — 10	+0.001	−0.004	0.000	+0.001
14. — 10	+0.001	+0.001	0.000	0.000
15. — 10	+0.003	−0.001	0.000	0.000
16. — 10	+0.005	0.000	0.000	0.000
1. — 11	0.000	0.000	−0.002	+0.001
2. — 11	0.000	0.000	+0.004	−0.004
3. — 11	+0.003	−0.002	−0.011	+0.010
4. — 11	−0.005	+0.005	+0.021	−0.024
5. — 11	+0.014	−0.013	−0.034	+0.053
6. — 11	−0.025	+0.032	+0.030	−0.095
7. — 11	+0.035	−0.067	+0.009	+0.118
8. — 11	−0.022	+0.105	−0.057	−0.072
9. — 11	−0.025	−0.111	+0.046	−0.002
10. — 11	+0.061	+0.051	−0.007	+0.020
11. — 11	−0.035	+0.016	+0.002	−0.008
12. — 11	+0.001	−0.019	−0.003	+0.001
13. — 11	−0.003	+0.005	+0.001	−0.001
14. — 11	+0.002	0.000	0.000	−0.001
15. — 11	0.000	+0.001	0.000	0.000
16. — 11	0.000	+0.001	0.000	0.000

$i.-i'$	$U(i.i'.c)$	$U(i.i'.s)$	$V(i.i'.c)$	$V(i.i'.s)$
2. — 12	0.000	0.000	−0.001	−0.002
3. — 12	0.000	0.000	+0.004	+0.004
4. — 12	+0.002	+0.003	−0.010	−0.009
5. — 12	−0.005	−0.005	+0.022	+0.015
6. — 12	+0.013	+0.010	−0.045	−0.019
7. — 12	−0.029	−0.017	+0.067	+0.008
8. — 12	+0.053	+0.018	−0.068	+0.022
9. — 12	−0.070	0.000	+0.030	−0.042
10. — 12	+0.060	−0.030	+0.009	+0.021
11. — 12	−0.016	+0.040	−0.012	0.000
12. — 12	−0.014	−0.013	+0.003	+0.001
13. — 12	+0.009	−0.003	−0.001	−0.001
14. — 12	−0.002	−0.002	+0.001	0.000
15. — 12	+0.001	+0.001	0.000	0.000
16. — 12	−0.001	0.000	0.000	0.000
3. — 13	0.000	0.000	+0.002	−0.002
4. — 13	0.000	0.000	−0.003	+0.004
5. — 13	−0.003	+0.003	+0.007	−0.008
6. — 13	+0.004	−0.005	−0.010	+0.019
7. — 13	−0.007	+0.011	+0.008	−0.033
8. — 13	+0.010	−0.024	+0.004	+0.045
9. — 13	−0.006	+0.038	−0.021	−0.038
10. — 13	−0.008	−0.045	+0.024	+0.010
11. — 13	+0.024	+0.031	−0.010	+0.007
12. — 13	−0.022	−0.002	−0.001	−0.006
13. — 13	+0.005	−0.010	0.000	+0.002
14. — 13	+0.002	+0.004	0.000	−0.001
15. — 13	+0.001	−0.001	0.000	+0.001
16. — 13	0.000	+0.001	0.000	0.000
17. — 13	0.000	−0.001	0.000	0.000
4. — 14	0.000	0.000	+0.001	+0.002
5. — 14	0.000	0.000	−0.004	−0.003
6. — 14	−0.002	−0.003	+0.008	+0.004
7. — 14	+0.005	+0.004	−0.015	−0.005
8. — 14	−0.009	−0.004	+0.022	+0.002
9. — 14	+0.017	+0.004	−0.026	+0.007
10. — 14	−0.024	0.000	+0.018	−0.017
11. — 14	+0.025	−0.010	0.000	+0.014
12. — 14	−0.013	+0.018	−0.007	−0.003
13. — 14	−0.003	−0.011	+0.004	−0.001
14. — 14	+0.006	+0.001	0.000	−0.001
15. — 14	−0.003	+0.001	+0.001	0.000
16. — 14	0.000	+0.001	0.000	0.000
17. — 14	−0.001	0.000	0.000	0.000
4. — 15	0.000	0.000	0.000	−0.001
5. — 15	0.000	0.000	−0.001	+0.002
6. — 15	0.000	+0.001	+0.002	−0.002
7. — 15	+0.002	−0.002	−0.003	+0.006
8. — 15	−0.003	+0.003	+0.003	−0.011
9. — 15	+0.003	−0.008	0.000	+0.016
10. — 15	−0.002	+0.012	−0.006	−0.014
11. — 15	−0.002	−0.016	+0.009	+0.007
12. — 15	+0.007	+0.013	−0.006	+0.001
13. — 15	−0.009	−0.005	−0.001	−0.002
14. — 15	+0.005	−0.003	+0.001	+0.001
15. — 15	+0.002	+0.002	+0.001	0.000
16. — 15	−0.001	0.000	−0.001	−0.001
17. — 15	−0.001	0.000	0.000	0.000
18. — 15	+0.001	+0.001	0.000	0.000

$i\,.\,-i'$	$U(i.i'.c)$	$U(i.i'.s)$	$V(i.i'.c)$	$V(i.i'.s)$	$i\,.\,-i'$	$U(i.i'.c)$	$U(i.i'.s)$	$V(i.i'.c)$	$V(i.i'.s)$
5. — 16	0.000	0.000	+0.001	0.000	13. — 16	—0.010	+0.007	+0.001	—0.005
6. — 16	0.000	0.000	—0.002	—0.001	14. — 16	+0.005	—0.007	—0.001	+0.002
7. — 16	—0.001	0.000	+0.002	+0.002	15. — 16	0.000	+0.004	0.000	—0.001
8. — 16	+0.002	+0.001	—0.006	—0.001	16. — 16	+0.001	—0.001	+0.001	+0.001
9. — 16	—0.003	—0.002	+0.009	+0.001	17. — 16	0.000	+0.001	0.000	+0.001
10. — 16	+0.007	+0.001	—0.012	+0.003	18. — 16	—0.001	—0.001	0.000	0.000
11. — 16	—0.010	0.000	+0.011	—0.007	19. — 16	0.000	—0.001	0.000	0.000
12. — 16	+0.012	—0.004	—0.006	+0.007					

Eine Kontrolle bekommt man durch Summirung voriger Gleichungen.

$$\sum_i G(i\,.\,i'\,.\,{}^c_s) = \frac{1}{3} A_1 \sum_i \beta\,(i+1\,.\,i'\,.\,{}^c_s) - A_2 \sum_i \beta(i\,.\,i'\,.\,{}^c_s) + A_1 \sum_i \beta(i-1\,.\,i'\,.\,{}^c_s) -$$

$$- \frac{1}{3} A_2 \sum_i \beta(i-2\,.\,i'\,.\,{}^c_s) + 2\sum_i \beta(i-1\,.\,i'\,.\,{}^c_s) + C_1 \sum_i c(i+1\,.\,i'\,.\,{}^c_s) -$$

$$- C_2 \sum_i c(i\,.\,i'\,.\,{}^c_s) - C_1 \sum_i c(i-1\,.\,i'\,.\,{}^c_s) + C_2 \sum_i c(i-2\,.\,i'\,.\,{}^c_s) -$$

$$- \sum_i c(i-1\,.\,i'\,.\,{}^c_s)$$

oder
$$\sum_i G(i\,.\,i'\,.\,{}^c_s) = \left(\frac{1}{3} A_1 - A_2 + A_1 - \frac{1}{3} A_2 + 2\right) . \sum_i \beta(i\,.\,i'\,.\,{}^c_s)$$

$$+ (C_1 - C_2 - C_1 + C_2 - 1) \,.\, \sum_i c(i\,.\,i'\,.\,{}^c_s)$$

also
$$\sum_i G(i\,.\,i'\,.\,{}^c_s) = \frac{2(1-e)}{\cos^2 \varphi} \,.\, \sum_i \beta(i\,.\,i'\,.\,{}^c_s) - \sum_i c(i\,.\,i'\,.\,{}^c_s)$$

und analog

$$\sum_i H(i\,.\,i'\,.\,{}^c_s) = \frac{2(1-e)}{\cos^2 \varphi} \,.\, \sum_i \beta(i\,.\,i'\,.\,{}^c_s) + \sum_i c(i\,.\,i'\,.\,{}^c_s)$$

$$\sum_i F(i\,.\,i'\,.\,{}^c_s) = -\frac{1}{2} \left\{ \sum_i G(i\,.\,i'\,.\,{}^c_s) + \sum_i H(i\,.\,i'\,.\,{}^c_s) \right\} - \sum_i \beta(i\,.\,i'\,.\,{}^c_s)$$

$$\sum_i U(i\,.\,i'\,.\,{}^c_s) = -\sum_i V(i\,.\,i'\,.\,{}^c_s) = \frac{(1-e)^2}{2} \,.\, \sum_i d(i\,.\,i'\,.\,{}^c_s)$$

$$\sum_i T(i\,.\,i'\,.\,{}^c_s) = -\sum_i U(i+1\,.\,i'\,i\,{}^c_s) - \sum_i V(i-1\,.\,i'\,.\,{}^c_s) = 0$$

Diese Kontrolle ist aus demselben Grund, den ich pag. (61) erwähnt, nicht allein genügend. Als zweite Kontrolle habe ich für $i = 3$ nach i' summirt.

Folgende Tabellen zeigen die Genauigkeit der Rechnung. Mit "Reihe" verstehe ich die linken und mit "Direkt" die rechten Seiten der verschiedenen Kontrollgleichungen. Die Abweichungen zwischen "Reihe" und "Direkt" sind hie und da ziemlich gross, doch nicht grösser, als dass die Rechnung als hinlänglich gut angesehen kann.

i'	$\sum_i F(i.i'.c)$ Reihe	$\sum_i F(i.i'.c)$ Direkt	$\sum_i G(i.i'.c)$ Reihe	$\sum_i G(i.i'.c)$ Direkt	$\sum_i H(i.i'.c)$ Reihe	$\sum_i H(i.i'.c)$ Direkt	$\sum_i T(i.i'.c)$ Reihe	$\sum_i U(i.i'.c)$ Reihe	$\sum_i U(i.i'.c)$ Direkt	$\sum_i V(i.i'.c)$ Reihe
0	0.000	0.000	−22.0532	−22.0532			0.000	+1.8672	+1.8672	−1.8672
1	− 1.986	− 1.986	− 3.172	− 3.171	+ 5.654	+ 5.655	0.000	+0.144	+0.148	−0.144
2	+82.660	+82.661	−24.366	−24.365	−79.003	−79.001	0.000	−2.106	−2.104	+2.106
3	+43.4604	+43.4603	−12.4016	−12.4011	−41.9463	−41.9461	−0.0001	+0.2483	+0.2487	−0.2483
4	− 5.690	− 5.690	+ 1.975	+ 1.974	+ 5.141	+ 5.140	0.000	+0.758	+0.757	−0.758
5	−12.9774	−12.9774	+ 3.9266	+ 3.9266	+12.3018	+12.3018	0.0000	+0.2182	+0.2184	−0.2183
6	− 3.382	− 3.381	+ 0.973	+ 0.968	+ 3.259	+ 3.254	0.000	−0.101	−0.100	+0.101
7	+ 1.742	+ 1.743	− 0.549	− 0.552	− 1.625	− 1.628	0.000	−0.094	−0.091	+0.094
8	+ 1.3679	+ 1.3676	− 0.4154	− 0.4153	− 1.2949	− 1.2945	0.0000	−0.0084	−0.0079	+0.0083
9	+ 0.078	+ 0.078	− 0.016	− 0.015	− 0.082	− 0.081	0.000	+0.017	+0.015	−0.017
10	− 0.256	− 0.254	+ 0.073	+ 0.079	+ 0.241	+ 0.247	0.000	+0.003	+0.005	−0.003
11	− 0.134	− 0.134	+ 0.046	+ 0.048	+ 0.119	+ 0.122	0.000	+0.001	0.000	−0.001
12	+ 0.024	+ 0.025	− 0.009	− 0.008	− 0.023	− 0.022	0.000	+0.001	0.000	−0.001
13	+ 0.055	+ 0.054	− 0.020	− 0.017	− 0.050	− 0.047	0.000	0.000	0.000	0.000
14	+ 0.004	+ 0.005	− 0.003	− 0.006	− 0.001	− 0.004	0.000	−0.002	−0.001	+0.002
15	− 0.018	− 0.017	+ 0.010	+ 0.009	+ 0.012	+ 0.011	0.000	+0.002	−0.001	−0.002
16	0.000	+ 0.002	− 0.002	0.000	− 0.002	0.000	0.000	+0.002	+0.001	−0.002

i'	$\sum_i F(i.i'.s)$ Reihe	$\sum_i F(i.i'.s)$ Direkt	$\sum_i G(i.i'.s)$ Reihe	$\sum_i G(i.i'.s)$ Direkt	$\sum_i H(i.i'.s)$ Reihe	$\sum_i H(i.i'.s)$ Direkt	$\sum_i T(i.i'.s)$ Reihe	$\sum_i U(i.i'.s)$ Reihe	$\sum_i U(i.i'.s)$ Direkt	$\sum_i V(i.i'.s)$ Reihe
0	− 4.4471	− 4.4471	+2.7808	+2.7802			0.0000	0.0000	0.0000	0.0000
1	− 9.534	− 9.537	−3.546	−3.550	+15.474	+15.472	0.000	+1.102	+1.103	−1.102
2	−39.562	−39.561	+9.749	+9.746	+39.723	+39.726	0.000	−1.539	−1.543	+1.539
3	+30.7928	+30.7931	−9.5865	−9.5866	−28.9209	−28.9206	0.0000	−1.5181	−1.5180	+1.5180
4	+26.199	+26.197	−7.744	−7.742	−25.016	−25.018	0.000	−0.171	−0.177	+0.171
5	+ 2.2654	+ 2.2654	−0.5574	−0.5574	− 2.2756	− 2.2758	+0.0002	+0.3110	+0.3116	−0.3112
6	− 5.370	− 5.370	+1.665	+1.668	+ 5.048	+ 5.050	0.000	+0.158	+0.154	−0.158
7	− 2.446	− 2.444	+0.721	+0.717	+ 2.337	+ 2.333	0.000	−0.018	−0.016	+0.018
8	+ 0.3273	+ 0.3274	−0.1106	−0.1109	− 0.2986	− 0.2989	0.0000	−0.0394	−0.0398	+0.0394
9	+ 0.568	+ 0.567	−0.142	−0.143	− 0.566	− 0.567	0.000	−0.012	−0.009	+0.012
10	+ 0.767	+ 0.766	−0.436	−0.436	− 0.522	− 0.522	0.000	+0.006	+0.004	−0.006
11	− 2.253	− 2.252	+1.424	+1.423	+ 1.391	+ 1.391	0.000	+0.004	+0.004	−0.004
12	− 0.664	− 0.664	+0.405	+0.408	+ 0.423	+ 0.426	0.000	+0.002	+0.001	−0.002
13	− 0.099	− 0.099	+0.059	+0.061	+ 0.063	+ 0.065	0.000	0.000	0.000	0.000
14	+ 0.024	+ 0.023	−0.010	−0.008	− 0.019	− 0.018	0.000	+0.001	0.000	−0.001
15	+ 0.003	+ 0.004	+0.004	0.000	− 0.006	− 0.010	0.000	−0.002	+0.001	+0.002
16	− 0.004	− 0.005	+0.003	+0.001	+ 0.005	+ 0.003	0.000	−0.002	−0.001	+0.002

	Reihe	Direkt
$\Sigma F(3.i'.c)$	+76.636	+76.636
$\Sigma F(3.i'.s)$	+30.938	+30.941
$\Sigma G(3.i'.c)$	−24.578	−24.573
$\Sigma G(3.i'.s)$	+34.326	+34.321
$\Sigma H(3.i'.c)$	+ 0.614	+ 0.613
$\Sigma H(3.i'.s)$	−50.467	−50.470
$\Sigma T(3.i'.c)$	− 1.278	− 1.276
$\Sigma T(3.i'.s)$	+ 1.619	+ 1.618
$\Sigma U(3.i'.c)$	+ 5.606	+ 5.606
$\Sigma U(3.i'.s)$	− 6.256	− 6.248
$\Sigma V(3.i'.c)$	+ 0.810	+ 0.811
$\Sigma V(3.i'.s)$	− 1.906	− 1.906

Wenn wir integriren, bekommen wir P, Q etc.; sieh pag (63). Ehe wir die numerischen Werte dieser Quantitäte angeben, wollen wir zeigen, wie sie kontrollirt werden.

Setzen wir in der Gleichung für $Y(i\,.\,i'\,.\,{}^{c}_{s})$ auf die rechte Seite statt $T(i\,.\,i'\,.\,{}^{c}_{s})$ dessen Wert in U und V ausgedrückt, ergiebt sich

$$\begin{aligned} Y(i\,.\,i'\,.\,{}^{c}_{s}) &= -\frac{U(i+1.i'.{}^{c}_{s})}{m} - \frac{V(i-1.i'.{}^{c}_{s})}{m} + \frac{U(i+1.i'.{}^{c}_{s})}{m+1} + \frac{V(i-1.i'.{}^{c}_{s})}{m-1} \\ &= -\frac{U(i+1.i'.{}^{c}_{s})}{m(m+1)} + \frac{V(i-1.i'.{}^{c}_{s})}{m(m-1)} \\ &= \frac{1}{m}\left(-\frac{U(i+1.i'.{}^{c}_{s})}{m+1} + \frac{V(i-1.i'.{}^{c}_{s})}{m-1}\right) \end{aligned}$$

also

$$Y(i\,.\,i'\,.\,{}^{c}_{s}) = \frac{W(i\,.\,i'\,.\,{}^{c}_{s})}{m}$$

Diese Formel ist als Kontrolle angewandt, kontrollirt natürlich aber nur, wenn vorher alle U und V kontrollirt sind.

Berechnet man also $Y(i\,.\,i'\,.\,{}^{c}_{s})$ nach beiden Formeln, werden dadurch sowohl $Y(i\,.\,i'\,.\,{}^{c}_{s})$ wie $W(i\,.\,i'\,.\,{}^{c}_{s})$ kontrollirt.

Setzen wir

$$\Pi(i\,.\,i'\,.\,{}^{c}_{s}) = \frac{1}{m}[F(i\,.\,i'\,.\,{}^{c}_{s}) + G(i+1\,.\,i'\,.\,{}^{c}_{s}) + H(i-1\,.\,i'\,.\,{}^{c}_{s})]$$

und berechnen $\Pi(i\,.\,i'\,.\,{}^{c}_{s})$, so ist dies eine Kontrolle von $P(i\,.\,i'\,.\,{}^{c}_{s})$ und $S(i\,.\,i'\,.\,{}^{c}_{s})$, da es ersichtlich ist, dass

$$\Pi(i\,.\,i'\,.\,{}^{c}_{s}) = P(i\,.\,i'\,.\,{}^{c}_{s}) + S(i\,.\,i'\,.\,{}^{c}_{s})$$

Auch die Kontrolle von P und S fordert, dass vorher die F, G und H kontrollirt sind.

Wir haben einerseits

$$\begin{aligned} \Delta\Pi(i) &= \Delta P(i) + \Delta S(i) \\ &= \frac{\Delta F(i)}{m} + \frac{\Delta G(i+1)}{m+1} + \frac{\Delta H(i-1)}{m-1} + \frac{\Delta Q(i)}{m} \\ &= \frac{\Delta F(i)}{m} + \frac{\Delta G(i+1)}{m+1} + \frac{\Delta H(i-1)}{m-1} + \frac{1}{m}\left\{\frac{\Delta G(i+1)}{m+1} - \frac{\Delta H(i-1)}{m-1}\right\} \\ &= \frac{\Delta F(i)}{m} + \frac{\Delta G(i+1)}{m} + \frac{\Delta H(i-1)}{m} \end{aligned}$$

Anderseits haben wir

$$\Delta\Pi(i) = \frac{1}{m}[\Delta F(i) + \Delta G(i+1) + \Delta H(i-1)]$$

Also ein Fehler in F, G oder H bewirkt einen gleich grossen Fehler in $\Pi(i)$ nach beiden Formeln, was auch von vornherein evident ist, da man leicht von einer Formel zur anderen durch eine einfache algebraische Transformation kommen kann. So auch mit der Kontrolle von Y.

$$R(i\,.\,i'\,.\,{}^{c}_{s}) = \frac{P(i\,.\,i'\,.\,{}^{c}_{s}) - \frac{e}{2}P(i+1\,.\,i'\,.\,{}^{c}_{s}) - \frac{e}{2}P(i-1\,.\,i'\,.\,{}^{c}_{s})}{m}$$

also

$$mR(i\,.\,i'\,.\,{}^{c}_{s}) = P(i\,.\,i'\,.\,{}^{c}_{s}) - \frac{e}{2}P(i+1\,.\,i'\,.\,{}^{c}_{s}) - \frac{e}{2}P(i-1\,.\,i'\,.\,{}^{c}_{s})$$

und

$$\sum_i mR(i\,.\,i'\,.\,{}^{c}_{s}) = \sum_i P(i\,.\,i'\,.\,{}^{c}_{s}) - \frac{e}{2}\sum_i P(i+1\,.\,i'\,.\,{}^{c}_{s}) - \frac{e}{2}\sum_i P(i-1\,.\,i'\,.\,{}^{c}_{s})$$

d. h.

$$\sum_i mR(i\,.\,i'\,.\,{}^{c}_{s}) = (1-e)\sum_i P(i\,.\,i'\,.\,{}^{c}_{s})$$

welche Gleichung eine Kontrolle der R-Koeffizienten ist. Für $i' = 0$ wird sie etwas verschieden:

$$R(0\,.\,0\,.\,c) + \sum_{i=1} i\,R(i\,.\,0\,.\,c) = (1-e)\sum_{i=0} P(i\,.\,0\,.\,c)$$

$$\sum_{i=1} i\,R(i\,.\,0\,.\,s) = (1-e)\sum_{i=1} I(i\,.\,0\,.\,s) + \frac{e}{2}P(1\,.\,0\,.\,s)$$

ε V	$\frac{dz}{dt}$		$2\frac{dv}{d\varepsilon}$		$\frac{1}{\cos i}\frac{du}{d\varepsilon}$		$\delta\frac{h}{h_0}$	
	cos	sin	cos	sin	cos	sin	cos	sin
0.—0	$1+k-34.54$		+ 0.03		— 2.23			
0.—0	$-0.02703\,nt$							
1.—0	$+10.96+k_1$	$+0.114+k_2$	$-0.16-k_2$	$-2.66+k_1$	$+3.92+l$	$+1.37-l_1$		
1.—0	$-0.27211\,nt$	$+14.50286\,nt$	$-14.50286\,nt$	$-0.27211\,nt$	$+3.17942\,nt$	$-7.49469\,nt$		
2.—0	+ 3.20	+ 2.03	— 3.15	+ 6.09	— 3.10	— 0.69	— 0.88	— 0.47
3.—0	— 0.45	— 0.14	+ 0.29	— 0.90	+ 0.46	+ 0.16	+ 0.15	+ 0.04
4.—0	+ 0.06	+ 0.03	— 0.06	+ 0.13	— 0.07	— 0.03	— 0.03	— 0.01
5.—0	— 0.01	0.00	+ 0.01	— 0.02	+ 0.01	+ 0.01	0.00	0.00
—5.—1	0.00	0.00	+ 0.01	— 0.01	0.00	0.00	0.00	0.00
—4.—1	— 0.01	— 0.01	— 0.04	+ 0.02	+ 0.01	+ 0.02	0.00	+ 0.01
—3.—1	+ 0.05	+ 0.09	+ 0.24	— 0.12	— 0.07	— 0.15	— 0.01	— 0.02
—2.—1	— 0.25	— 0.77	— 1.59	+ 0.55	+ 0.38	+ 0.98	+ 0.02	+ 0.10
—1.—1	+ 4.29	+ 9.38	+13.05	— 5.57	— 3.54	— 9.66	— 0.23	+ 0.11
0.—1	— 2.224	+ 8.903	+ 0.330	+ 1.095	— 3.235	— 3.375	— 0.689	— 8.024
1.—1	—15.421	—119.964	+81.533	—10.149	— 5.601	— 0.777	— 0.843	—10.689

ε V	$\frac{dz}{dt}$		$2\frac{dv}{d\varepsilon}$		$\frac{1}{\cos i}\frac{du}{d\varepsilon}$		$\delta\frac{h}{h_0}$	
	cos	sin	cos	sin	cos	sin	cos	sin
2. — 1	+ 2.99	— 14.32	+ 19.99	+ 3.72	— 2.05	+ 9.99	— 0.70	+ 2.00
3. — 1	— 0.70	+ 2.19	— 3.80	— 1.19	+ 0.18	— 1.40	+ 0.25	— 0.74
4. — 1	+ 0.05	— 0.22	+ 0.44	+ 0.11	— 0.06	+ 0.20	— 0.02	+ 0.10
5. — 1	— 0.02	+ 0.03	— 0.07	— 0.03	+ 0.01	— 0.04	+ 0.01	— 0.02
6. — 1	0.00	— 0.01	+ 0.01	+ 0.01	0.00	+ 0.01	0.00	0.00
— 4. — 2	0.00	0.00	+ 0.01	+ 0.01	+ 0.01	— 0.01	0.00	0.00
— 3. — 2	+ 0.02	— 0.01	— 0.04	— 0.07	— 0.05	+ 0.03	0.00	0.00
— 2. — 2	— 0.11	+ 0.06	+ 0.20	+ 0.36	+ 0.31	— 0.17	— 0.02	+ 0.01
— 1. — 2	+ 0.66	— 0.48	— 1.18	— 2.05	— 2.53	+ 1.42	+ 0.51	— 0.19
0. — 2	— 10.910	— 0.063	+ 2.198	+ 14.696	—16.016	+11.028	— 8.684	+ 2.986
1. — 2	—262.443	+ 94.625	— 33.069	— 90.278	— 4.098	+ 3.218	—101.485	+38.667
2. — 2	—444.55	+179.70	—207.11	—511.87	+ 1.58	+ 9.81	+ 34.44	—13.75
3. — 2	+ 5.01	+ 1.21	— 2.00	+ 7.32	— 3.35	— 0.03	— 1.76	— 0.32
4. — 2	— 0.97	— 0.22	+ 0.38	— 1.79	+ 0.54	+ 0.01	+ 0.42	+ 0.10
5. — 2	+ 0.10	+ 0.02	— 0.04	+ 0.21	— 0.09	— 0.02	— 0.05	— 0.01
6. — 2	— 0.02	— 0.01	+ 0.02	— 0.04	+ 0.02	+ 0.01	+ 0.01	0.00
7. — 2	0.00	0.00	0.00	+ 0.01	0.00	0.00	0.00	0.00
— 3. — 3	0.00	0.00	— 0.02	+ 0.01	+ 0.01	+ 0.02	0.00	0.00
— 2. — 3	+ 0.01	+ 0.02	+ 0.10	— 0.06	— 0.05	— 0.06	+ 0.01	+ 0.01
— 1. — 3	— 0.10	— 0.04	— 0.49	+ 0.31	+ 0.31	+ 0.64	— 0.04	— 0.19
0. — 3	+ 4.566	— 3.734	— 1.868	— 5.367	— 7.144	—14.716	+ 0.193	+ 2.078
1. — 3	— 4.5072	—120.9814	— 25.0111	+ 1.5947	— 1.2717	— 1.1354	— 7.9650	—74.6340
2. — 3	— 96.538	—508.575	+466.463	— 90.377	—32.060	—23.057	— 7.088	—26.273
3. — 3	— 34.50	— 53.70	+ 76.12	— 49.26	— 1.58	+ 1.37	+ 8.18	+13.04
4. — 3	— 0.88	+ 1.62	— 2.49	— 1.61	— 0.25	— 1.33	+ 0.32	— 0.75
5. — 3	+ 0.03	— 0.47	+ 0.90	+ 0.04	+ 0.01	+ 0.22	— 0.02	+ 0.24
6. — 3	— 0.01	+ 0.05	— 0.09	— 0.01	+ 0.01	— 0.04	0.00	— 0.03
7. — 3	0.00	— 0.01	+ 0.02	+ 0.01	0.00	+ 0.01	0.00	+ 0.01
— 3. — 4	0.00	0.00	+ 0.01	+ 0.01	+ 0.01	0.00	0.00	0.00
— 2. — 4	0.00	0.00	— 0.02	— 0.03	— 0.03	+ 0.02	+ 0.01	0.00
— 1. — 4	0.00	+ 0.03	+ 0.09	+ 0.13	+ 0.16	— 0.08	— 0.05	+ 0.01
0. — 4	— 0.22	— 0.35	— 0.60	— 0.38	— 1.38	+ 0.69	+ 0.47	— 0.05
1. — 4	— 8.570	— 1.243	— 0.362	+ 7.281	— 2.215	+ 1.43	— 5.879	+ 0.520
2. — 4	— 71.683	+ 10.174	— 6.713	— 44.533	— 2.938	+ 2.105	— 18.062	+ 3.355
3. — 4	— 66.83	+ 24.33	— 29.43	— 83.49	— 2.55	+ 6.923	+ 11.03	— 4.66
4. — 4	+ 13.11	— 12.35	+ 19.72	+ 20.65	— 0.80	— 0.35	— 4.84	+ 4.44
5. — 4	— 0.68	— 0.57	+ 1.08	— 1.12	+ 0.54	— 0.21	+ 0.37	— 0.26
6. — 4	+ 0.22	— 0.03	+ 0.07	+ 0.43	— 0.09	+ 0.01	— 0.13	+ 0.02
7. — 4	— 0.02	— 0.01	+ 0.01	— 0.04	+ 0.02	0.00	+ 0.01	0.00
8. — 4	+ 0.01	0.00	0.00	+ 0.01	0.00	0.00	0.00	0.00
— 2. — 5	0.00	0.00	— 0.01	+ 0.01	+ 0.01	+ 0.01	0.00	0.00
— 1. — 5	+ 0.01	0.00	+ 0.04	— 0.03	— 0.03	— 0.04	0.00	+ 0.02
0. — 5	— 0.05	+ 0.05	— 0.14	+ 0.14	+ 0.15	+ 0.28	— 0.02	— 0.12
1. — 5	— 1.545	+ 4.249	+ 4.694	+ 1.239	+ 2.601	+ 4.399	+ 0.137	+ 1.087
2. — 5	+ 6.4797	+ 54.0214	— 9.6244	+ 1.2708	— 0.0577	+ 0.1034	+ 4.0894	+26.0248
3. — 5	+ 35.732	+135.407	—144.270	+ 37.775	+13.478	+11.039	— 2.012	— 6.621
4. — 5	— 8.98	— 15.59	+ 22.68	— 12.58	— 2.03	— 0.15	+ 3.05	+ 4.90
5. — 5	+ 4.97	+ 3.65	— 6.08	+ 8.47	+ 0.02	— 0.42	— 2.25	— 1.70
6. — 5	+ 0.33	— 0.36	+ 0.62	+ 0.64	+ 0.13	+ 0.22	— 0.17	+ 0.21
7. — 5	+ 0.04	+ 0.10	— 0.20	+ 0.08	0.00	— 0.04	— 0.02	— 0.06
8. — 5	0.00	— 0.01	+ 0.02	+ 0.01	0.00	+ 0.01	0.00	+ 0.01
9. — 5	0.00	0.00	— 0.01	0.00	0.00	0.00	0.00	0.00
— 1. — 6	0.00	0.00	— 0.01	— 0.01	— 0.01	+ 0.01	+ 0.01	0.00
0. — 6	+ 0.01	+ 0.01	+ 0.04	+ 0.05	+ 0.07	— 0.04	— 0.03	+ 0.01
1. — 6	— 0.42	— 0.23	— 0.34	+ 0.21	— 0.83	+ 0.50	+ 0.25	— 0.04
2. — 6	— 6.387	+ 0.330	+ 0.257	+ 2.692	— 0.317	+ 0.255	— 4.142	+ 0.673
3. — 6	— 31.548	+ 7.447	— 6.246	— 26.323	— 2.187	+ 1.898	— 3.820	+ 0.946

ε V	$\frac{dz}{dt}$ cos	$\frac{dz}{dt}$ sin	$2\frac{d\nu}{d\varepsilon}$ cos	$2\frac{d\nu}{d\varepsilon}$ sin	$\frac{1}{\cos i}\frac{du}{d\varepsilon}$ cos	$\frac{1}{\cos i}\frac{du}{d\varepsilon}$ sin	$\delta\frac{h}{h_0}$ cos	$\delta\frac{h}{h_0}$ sin
4. — 6	— 12.58	+ 5.26	— 6.69	— 16.51	— 0.97	+ 1.97	+ 3.11	— 1.42
5. — 6	+ 5.06	— 4.28	+ 6.56	+ 8.05	— 0.17	— 0.74	— 2.13	+ 1.89
6. — 6	— 1.01	+ 2.05	— 3.64	— 1.72	+ 0.20	— 0.05	+ 0.55	— 1.08
7. — 6	+ 0.21	+ 0.17	— 0.33	+ 0.38	— 0.08	+ 0.07	— 0.13	— 0.10
8. — 6	— 0.04	+ 0.03	— 0.06	— 0.08	+ 0.02	0.00	+ 0.03	— 0.02
0. — 7	0.00	— 0.01	+ 0.01	— 0.01	— 0.01	— 0.02	0.00	0.00
1. — 7	— 0.03	+ 0.05	— 0.02	+ 0.07	+ 0.08	+ 0.13	— 0.01	+ 0.01
2. — 7	— 0.100	+ 1.039	+ 1.008	— 0.002	+ 0.275	+ 0.382	+ 0.102	— 0.064
3. — 7	+ 1.829	+ 8.289	— 4.070	+ 0.908	+ 0.133	+ 0.202	+ 0.635	+ 0.557
4. — 7	+ 4.18	+11.78	—13.82	+ 4.88	+ 1.63	+ 1.26	— 0.62	+ 2.76
5. — 7	— 2.43	— 3.98	+ 5.84	— 3.43	— 0.79	— 0.19	+ 0.98	— 1.68
6. — 7	+ 2.13	+ 1.75	— 2.96	+ 3.47	+ 0.27	— 0.16	— 1.10	+ 1.52
7. — 7	— 0.84	— 0.25	+ 0.41	— 1.53	+ 0.05	+ 0.09	+ 0.49	— 0.88
8. — 7	— 0.08	+ 0.12	— 0.23	— 0.15	— 0.04	— 0.03	+ 0.05	+ 0.15
9. — 7	— 0.02	— 0.02	+ 0.03	— 0.04	0.00	+ 0.01	+ 0.01	— 0.08
10. — 7	0.00	0.00	— 0.01	0.00	0.00	0.00	0.00	+ 0.01
0. — 8	0.00	0.00	0.00	0.00	— 0.01	0.00	0.00	0.00
1. — 8	+ 0.01	0.00	+ 0.02	+ 0.01	+ 0.03	— 0.02	— 0.02	0.00
2. — 8	— 8.046	— 2.120	— 2.160	+ 7.991	— 8.078	+ 5.725	+ 0.116	— 0.024
3. — 8	— 84.8081	+15.5438	+ 0.2013	+ 0.9998	— 0.0279	+ 0.0329	—46.340	+10.869
4. — 8	—263.619	+87.416	—87.037	—262.494	—25.143	+26.278	— 0.892	+ 0.290
5. — 8	— 2.68	+ 1.35	— 1.80	— 3.65	— 0.27	+ 0.54	+ 0.85	— 0.44
6. — 8	+ 1.52	— 1.31	+ 1.97	+ 2.40	0.00	— 0.35	— 0.72	+ 0.65
7. — 8	— 0.59	+ 1.06	— 1.79	— 1.03	+ 0.10	+ 0.09	+ 0.33	— 0.61
8. — 8	+ 0.05	— 0.33	+ 0.62	+ 0.06	— 0.04	+ 0.04	— 0.03	+ 0.21
9. — 8	— 0.07	— 0.03	+ 0.06	— 0.14	— 0.01	— 0.02	+ 0.05	+ 0.02
10. — 8	0.00	— 0.01	+ 0.02	+ 0.01	0.00	0.00	0.00	+ 0.01
1. — 9	0.00	0.00	0.00	— 0.01	0.00	— 0.01	0.00	0.00
2. — 9	— 0.01	+ 0.03	+ 0.01	+ 0.02	+ 0.04	+ 0.06	— 0.01	— 0.03
3. — 9	+ 0.047	+ 0.482	+ 0.304	— 0.049	+ 0.047	+ 0.055	+ 0.079	+ 0.308
4. — 9	+ 0.874	+ 2.734	— 2.006	+ 0.640	+ 0.141	+ 0.151	+ 0.164	+ 0.521
5. — 9	+ 0.88	+ 1.95	— 2.44	+ 1.10	+ 0.35	+ 0.24	— 0.20	— 0.44
6. — 9	— 0.70	— 1.01	+ 1.50	— 1.00	— 0.26	— 0.07	+ 0.31	+ 0.44
7. — 9	+ 0.72	+ 0.60	— 1.00	+ 1.15	+ 0.16	— 0.04	— 0.41	— 0.33
8. — 9	— 0.52	— 0.17	+ 0.32	— 0.90	— 0.02	+ 0.06	+ 0.32	+ 0.11
9. — 9	+ 0.13	0.00	+ 0.01	+ 0.24	— 0.02	— 0.01	— 0.09	0.00
10. — 9	+ 0.01	— 0.04	+ 0.08	+ 0.02	+ 0.01	0.00	— 0.01	+ 0.03
11. — 9	+ 0.01	0.00	0.00	+ 0.01	0.00	0.00	0.00	0.00
2. —10	+ 0.01	0.000	+ 0.01	0.00	+ 0.01	— 0.01	— 0.01	0.00
3. —10	+ 0.128	+ 0.017	+ 0.004	— 0.135	+ 0.068	— 0.045	+ 0.051	— 0.013
4. —10	+ 1.154	— 0.354	+ 0.122	+ 0.393	+ 0.010	— 0.002	+ 0.474	— 0.151
5. —10	+ 2.21	— 0.93	+ 1.05	+ 2.47	+ 0.25	— 0.32	— 0.22	+ 0.09
6. —10	— 0.62	+ 0.36	— 0.51	— 0.86	— 0.07	+ 0.16	+ 0.23	— 0.14
7. —10	+ 0.43	— 0.40	+ 0.60	+ 0.66	+ 0.01	— 0.13	— 0.22	+ 0.21
8. —10	— 0.23	+ 0.40	— 0.65	— 0.39	+ 0.04	+ 0.07	+ 0.13	— 0.24
9. —10	+ 0.04	— 0.24	+ 0.44	+ 0.07	— 0.03	0.00	— 0.02	+ 0.16
10. —10	0.00	+ 0.04	— 0.09	+ 0.02	0.00	— 0.01	0.00	— 0.03
11. —10	+ 0.02	+ 0.02	0.00	+ 0.04	0.00	0.00	— 0.01	— 0.02
12. —10	0.00	— 0.03	+ 0.01	0.00	0.00	0.00	0.00	+ 0.02
3. —11	— 0.02	+ 0.04	+ 0.03	+ 0.03	+ 0.04	— 0.04	0.00	— 0.01
4. —11	+ 0.116	+ 0.427	+ 0.091	— 0.027	+ 0.006	+ 0.006	+ 0.081	+ 0.240
5. —11	+ 0.696	+ 1.704	— 1.567	+ 0.637	+ 0.161	+ 0.142	+ 0.037	+ 0.110
6. —11	+ 0.20	+ 0.37	— 0.48	+ 0.26	+ 0.08	+ 0.05	— 0.06	— 0.11
7. —11	— 0.19	— 0.25	+ 0.37	— 0.28	— 0.08	— 0.02	+ 0.09	+ 0.12
8. —11	+ 0.23	+ 0.18	— 0.30	+ 0.35	+ 0.06	— 0.01	— 0.13	— 0.11
9. —11	— 0.21	— 0.09	+ 0.15	— 0.36	— 0.03	+ 0.03	+ 0.14	+ 0.06
10. —11	+ 0.12	+ 0.02	+ 0.01	+ 0.21	0.00	— 0.01	— 0.08	— 0.02

ε V	$\frac{dz}{dt}$		$2\frac{dv}{d\varepsilon}$		$\frac{1}{\cos i}\frac{du}{d\varepsilon}$		$\delta\frac{h}{h_0}$	
	cos	sin	cos	sin	cos	sin	cos	sin
11. — 11	−0.02	−0.06	0.00	−0.04	+0.01	0.00	+0.02	+0.06
12. — 11	0.00	+0.11	−0.08	+0.01	0.00	0.00	0.00	−0.10
13. — 11	0.00	+0.02	+0.01	0.00	0.00	0.00	0.00	−0.02
3. — 12	+0.01	0.00	+0.01	0.00	+0.01	0.00	0.00	0.00
4. — 12	+0.054	+0.005	−0.001	−0.042	+0.007	−0.007	+0.028	−0.008
5. — 12	+0.260	−0.122	+0.075	+0.162	+0.010	−0.011	+0.071	−0.031
6. — 12	+0.30	−0.153	+0.19	+0.36	+0.04	−0.06	−0.06	+0.03
7. — 12	−0.15	+0.10	−0.15	−0.21	−0.02	+0.05	+0.06	−0.04
8. — 12	+0.12	−0.12	+0.18	+0.18	0.00	−0.04	−0.07	+0.07
9. — 12	−0.08	+0.13	−0.22	−0.13	+0.01	+0.03	+0.05	−0.08
10. — 12	+0.02	−0.10	+0.19	+0.04	−0.02	−0.01	−0.01	+0.07
11. — 12	+0.01	+0.03	−0.09	−0.02	+0.01	0.00	−0.01	−0.01
12. — 12	0.00	+0.02	−0.01	0.00	0.00	0.00	0.00	−0.02
13. — 12	−0.01	+0.01	0.00	−0.01	0.00	0.00	0.00	−0.01
4. — 13	+0.022	−0.045	−0.045	−0.018	−0.031	−0.032	−0.001	−0.005
5. — 13	−0.078	−0.253	+0.040	−0.013	+0.001	0.000	−0.050	−0.118
6. — 13	−0.28	−0.55	+0.58	−0.29	−0.08	−0.07	+0.01	+0.03
7. — 13	+0.05	+0.08	−0.11	+0.07	+0.03	+0.01	−0.02	−0.03
8. — 13	−0.06	−0.07	+0.10	−0.09	−0.03	−0.01	+0.03	+0.03
9. — 13	+0.07	+0.05	−0.09	+0.11	+0.02	0.00	−0.04	−0.03
10. — 13	−0.07	−0.03	+0.05	−0.13	−0.01	+0.01	+0.05	+0.02
11. — 13	+0.05	−0.01	0.00	+0.10	0.00	−0.01	−0.03	+0.01
12. — 13	−0.01	+0.01	−0.02	−0.04	0.00	0.00	+0.01	−0.01
13. — 13	−0.01	0.00	0.00	0.00	0.00	0.00	+0.01	0.00
4. — 14	0.000	0.00	0.00	+0.01	0.00	0.00	0.00	0.00
5. — 14	+0.030	+0.002	0.000	−0.012	+0.002	−0.002	+0.016	−0.004
6. — 14	+0.133	−0.045	+0.035	+0.103	+0.010	−0.013	+0.016	−0.004
7. — 14	+0.05	−0.03	+0.03	+0.06	+0.01	−0.01	−0.01	+0.01
8. — 14	−0.04	+0.03	−0.04	−0.05	0.00	+0.01	+0.02	−0.01
9. — 14	+0.03	−0.04	+0.06	+0.05	0.00	−0.01	−0.02	+0.03
10. — 14	−0.02	+0.04	−0.07	−0.04	0.00	+0.01	+0.01	−0.03
11. — 14	+0.01	−0.04	+0.07	+0.01	−0.01	−0.01	−0.01	+0.03
12. — 14	+0.01	+0.03	−0.05	+0.01	0.00	0.00	0.00	−0.02
13. — 14	−0.01	−0.01	+0.02	−0.01	0.00	0.00	0.00	+0.01
5. — 15	0.000	+0.003	+0.001	0.000	+0.001	0.000	0.000	−0.002
6. — 15	−0.010	−0.030	+0.014	−0.005	−0.001	0.000	−0.003	−0.008
7. — 15	−0.03	−0.05	+0.07	−0.03	−0.01	−0.01	0.00	+0.01
8. — 15	+0.02	+0.02	−0.03	+0.02	+0.01	0.00	−0.01	−0.01
9. — 15	−0.02	−0.02	+0.03	−0.03	−0.01	0.00	+0.01	+0.01
10. — 15	+0.02	+0.02	−0.03	+0.04	+0.01	0.00	−0.02	−0.01
11. — 15	−0.03	−0.01	+0.02	−0.04	−0.01	0.00	+0.02	+0.01
12. — 15	+0.02	0.00	0.00	+0.04	0.00	0.00	−0.02	0.00
13. — 15	−0.01	+0.01	−0.01	−0.02	0.00	0.00	+0.01	0.00
14. — 15	0.00	0.00	+0.01	+0.01	0.00	0.00	0.00	0.00
6. — 16	−0.064	0.000	0.000	−0.001	0.000	0.000	0.000	0.000
7. — 16	+0.53	−0.25	+0.25	+0.53	+0.06	+0.13	0.00	0.00
8. — 16	+0.01	−0.01	+0.01	+0.02	0.00	0.00	−0.01	0.00
9. — 16	−0.01	+0.01	−0.01	−0.01	0.00	+0.01	+0.01	0.00
10. — 16	+0.01	−0.01	+0.02	+0.01	0.00	−0.01	−0.01	+0.01
11. — 16	−0.01	+0.01	−0.02	−0.01	0.00	+0.01	+0.01	−0.01
12. — 16	0.00	−0.02	+0.02	0.00	0.00	0.00	0.00	+0.01
13. — 16	0.00	+0.01	−0.02	+0.01	0.00	0.00	0.00	−0.01
14. — 16	0.00	−0.01	+0.01	−0.01	0.00	0.00	0.00	0.00

$\delta\frac{h}{h_0}$ ist nur als Kontrolle angegeben und daher keine Konstantenbestimmung da ausgeführt. Die Formel sieh Hansen II pag. 70.

ε V	nz		2ν		$\frac{u}{\cos i}$	
	cos	sin	cos	sin	cos	sin
0. — 0	$c+\left\{1-37.06614\right.$		2 C		$-2.78-el_1$	
0. — 0	$+k-\frac{e}{2}k_1\Big\}nt$		$+0.054064\,nt$		$-1.48906\,nt$	
1. — 0	$-0.180-k_2$	$+24.71+\left(1-\frac{e^2}{2}\right)k_1$	$-11.85-k_1$	$-0.42-k_2$	$+1.81+l_1$	$-3.87+l$
1. — 0	$-14.50286\,nt$	$-0.26674\,nt$	$+0.27211\,nt$	$-14.50286\,nt$	$+7.49469\,nt$	$+3.17942\,nt$
2. — 0	$-1.00+\frac{e}{4}k_2$	$-0.001-\frac{e}{4}k_1$	— 2.32	— 1.56	+ 0.19	— 1.18
2. — 0	$+0.72036\,nt$	$+0.01352\,nt$				
3. — 0	+ 0.12	— 0.24	+ 0.30	+ 0.10	— 0.05	+ 0.15
4. — 0	— 0.01	+ 0.03	— 0.03	— 0.02	+ 0.01	— 0.02
— 4. — 1	— 0.01	0.00	+ 0.01	+ 0.01	+ 0.01	0.00
— 3. — 1	+ 0.05	— 0.02	— 0.03	— 0.07	— 0.05	+ 0.02
— 2. — 1	— 0.72	+ 0.29	+ 0.23	+ 0.67	+ 0.42	— 0.16
— 1. — 1	+ 6.23	— 3.29	— 4.05	— 9.49	— 7.02	+ 2.57
0. — 1	+ 52.96	+ 2.97	+ 2.91	— 0.88	— 8.98	+ 8.61
1. — 1	+191.41	— 24.83	+ 16.26	+130.65	+ 1.24	— 8.98
2. — 1	+ 1.61	+ 2.83	— 2.29	+ 12.31	— 6.15	— 1.26
3. — 1	— 1.39	— 0.38	+ 0.45	— 1.45	+ 0.53	+ 0.07
4. — 1	+ 0.12	+ 0.04	— 0.03	+ 0.12	— 0.05	— 0.02
5. — 1	— 0.01	0.00	+ 0.01	— 0.02	+ 0.01	0.00
— 3. — 2	— 0.01	— 0.01	— 0.02	+ 0.01	+ 0.01	+ 0.01
— 2. — 2	+ 0.04	+ 0.06	+ 0.13	— 0.07	— 0.06	— 0.12
— 1. — 2	+ 0.27	— 1.01	— 1.17	+ 0.67	+ 0.81	+ 1.44
0. — 2	— 12.52	— 20.08	+ 19.55	— 2.92	+ 14.67	+21.30
1. — 2	—309.48	—875.46	+363.88	—133.29	— 12.98	—16.51
2. — 2	—136.35	—335.70	+410.12	—165.94	— 7.86	+ 1.26
3. — 2	+ 7.39	+ 21.92	— 3.26	— 0.89	+ 0.01	— 1.49
4. — 2	+ 0.11	— 0.46	+ 0.55	+ 0.12	0.00	+ 0.17
5. — 2	— 0.01	+ 0.05	— 0.05	— 0.01	+ 0.01	— 0.02
6. — 2	0.00	— 0.01	+ 0.01	0.00	0.00	0.00
— 3. — 3	0.00	0.00	0.00	0.00	0.00	0.00
— 2. — 3	+ 0.01	— 0.01	— 0.02	— 0.03	— 0.02	+ 0.02
— 1. — 3	+ 0.15	+ 0.26	+ 0.15	+ 0.23	+ 0.30	— 0.14
0. — 3	+ 7.35	— 4.45	— 4.76	+ 1.66	— 13.05	+ 6.33
1. — 3	—548.17	— 36.21	+ 12.47	+195.62	— 8.88	+ 9.95
2. — 3	+563.24	—106.25	+103.63	+534.85	+ 26.44	—36.76
3. — 3	+ 1.78	— 13.26	+ 26.31	+ 40.66	— 0.73	— 0.84
4. — 3	— 2.44	+ 0.88	+ 0.56	— 0.87	+ 0.46	— 0.09
5. — 3	+ 0.16	+ 0.03	— 0.01	+ 0.23	— 0.06	0.00
6. — 3	— 0.02	0.00	0.00	— 0.02	+ 0.01	0.00
— 2. — 4	0.00	0.00	— 0.01	+ 0.01	0.00	+ 0.01
— 1. — 4	+ 0.02	— 0.01	+ 0.05	— 0.04	— 0.03	— 0.07
0. — 4	— 0.15	— 0.42	— 0.25	+ 0.40	+ 0.46	+ 0.92
1. — 4	— 4.41	+ 2.83	+ 14.45	+ 0.72	+ 2.83	+ 4.40
2. — 4	— 15.88	—129.37	+ 89.75	— 13.53	— 4.24	— 5.92
3. — 4	— 16.40	— 40.78	+ 55.80	— 19.67	— 4.63	— 1.70
4. — 4	+ 5.89	+ 7.94	— 8.27	+ 7.90	+ 0.14	— 0.32
5. — 4	— 0.19	— 0.57	+ 0.32	+ 0.31	+ 0.06	+ 0.16
6. — 4	— 0.01	+ 0.07	— 0.10	+ 0.02	0.00	— 0.02
7. — 4	0.00	— 0.01	+ 0.01	0.00	0.00	0.00
— 1. — 5	0.00	0.00	— 0.01	— 0.01	— 0.02	+ 0.01
0. — 5	— 0.20	— 0.05	+ 0.08	+ 0.07	+ 0.15	— 0.08
1. — 5	— 1.28	+ 2.48	+ 1.41	— 5.34	+ 5.00	— 2.96

ε V	nz		2ν		$\frac{u}{\cos i}$	
	cos	sin	cos	sin	cos	sin
2. — 5	—333.91	+ 25.65	— 10.57	— 80.05	— 0.86	— 0.48
3. — 5	—117.47	+ 32.12	— 33.72	—128.79	— 9.85	+12.03
4. — 5	+ 13.87	— 6.14	+ 5.93	+ 10.70	+ 0.07	— 0.96
5. — 5	— 1.68	+ 1.87	— 2.72	— 1.95	+ 0.13	+ 0.01
6. — 5	+ 0.18	— 0.04	— 0.16	+ 0.15	— 0.05	+ 0.03
7. — 5	— 0.03	0.00	— 0.02	— 0.04	+ 0.01	0.00
8. — 5	0.00	0.00	0.00	0.00	— 0.02	0.00
0. — 6	+ 0.02	— 0.02	+ 0.02	— 0.02	— 0.02	— 0.03
1. — 6	— 0.21	— 0.17	+ 0.17	+ 0.27	+ 0.40	+ 0.66
2. — 6	— 1.51	+ 12.56	+ 10.53	— 1.01	+ 0.99	+ 1.24
3. — 6	— 9.26	— 39.86	+ 35.37	— 8.39	— 2.55	— 2.94
4. — 6	— 2.83	— 5.70	+ 9.46	— 3.84	— 1.13	— 0.56
5. — 6	+ 1.82	+ 2.34	— 2.93	+ 2.39	+ 0.27	— 0.06
6. — 6	— 0.66	— 0.41	+ 0.46	— 0.97	+ 0.01	+ 0.05
7. — 6	+ 0.01	+ 0.07	— 0.08	— 0.07	— 0.02	— 0.02
8. — 6	0.00	— 0.01	+ 0.01	— 0.01	0.00	0.00
0. — 7	0.00	0.00	— 0.01	— 0.01	— 0.01	0.00
1. — 7	— 0.03	+ 0.01	+ 0.04	+ 0.01	+ 0.08	— 0.05
2. — 7	+ 0.33	+ 0.44	0.00	— 1.60	+ 0.61	— 0.44
3. — 7	— 19.05	+ 3.86	— 2.47	— 11.05	— 0.55	+ 0.36
4. — 7	— 8.30	+ 3.10	— 3.57	— 10.10	— 0.92	+ 1.19
5. — 7	+ 2.25	— 1.29	+ 1.45	+ 2.47	+ 0.08	— 0.34
6. — 7	— 0.65	+ 0.73	— 1.03	— 0.88	+ 0.05	+ 0.08
7. — 7	+ 0.10	— 0.24	+ 0.35	+ 0.10	— 0.02	+ 0.01
8. — 7	— 0.03	0.00	+ 0.03	— 0.04	+ 0.01	— 0.01
9. — 7	0.00	0.00	+ 0.01	+ 0.01	0.00	0.00
1. — 8	+ 0.11	— 0.40	+ 0.01	— 0.01	— 0.01	— 0.01
2. — 8	— 3.64	— 0.38	+ 7.93	+ 2.14	+ 5.68	+ 8.02
3. — 8	+927.48	+7584.82	+131.15	— 26.41	+ 4.31	+ 3.65
4. — 8	— 86.40	— 256.89	+264.51	— 87.71	—26.48	—25.34
5. — 8	+ 3.62	+ 11.72	+ 1.83	— 0.90	— 0.27	— 0.14
6. — 8	+ 0.52	+ 0.62	— 0.80	+ 0.66	+ 0.12	0.00
7. — 8	— 0.31	— 0.19	+ 0.26	— 0.45	— 0.02	+ 0.03
8. — 8	+ 0.09	+ 0.02	— 0.01	+ 0.12	— 0.01	— 0.01
9. — 8	0.00	— 0.01	+ 0.02	+ 0.01	0.00	0.00
2. — 9	— 0.01	+ 0.01	+ 0.01	— 0.01	+ 0.04	— 0.03
3. — 9	+ 0.54	+ 0.10	— 0.13	— 0.79	+ 0.14	— 0.12
4. — 9	— 4.04	+ 1.27	— 1.04	— 3.25	— 0.24	+ 0.23
5. — 9	— 1.10	+ 0.53	— 0.68	— 1.51	— 0.15	+ 0.22
6. — 9	+ 0.48	— 0.33	+ 0.38	+ 0.57	+ 0.03	— 0.10
7. — 9	— 0.20	+ 0.23	— 0.32	— 0.28	+ 0.01	+ 0.04
8. — 9	+ 0.05	— 0.13	+ 0.20	+ 0.07	— 0.01	— 0.01
9. — 9	0.00	+ 0.03	— 0.04	0.00	0.00	0.00
10. — 9	+ 0.01	0.00	0.00	+ 0.01	0.00	0.00
2. — 10	0.00	0.00	0.00	0.00	0.00	— 0.01
3. — 10	+ 0.07	— 0.02	— 0.18	— 0.01	— 0.06	— 0.09
4. — 10	+ 1.09	+ 3.83	— 1.63	+ 0.51	+ 0.01	+ 0.05
5. — 10	+ 0.75	+ 1.74	— 1.99	+ 0.84	+ 0.26	+ 0.20
6. — 10	— 0.22	— 0.39	+ 0.38	— 0.23	— 0.07	— 0.03
7. — 10	+ 0.15	+ 0.16	— 0.21	+ 0.19	+ 0.04	0.00
8. — 10	— 0.11	— 0.07	+ 0.09	— 0.15	— 0.02	+ 0.01
9. — 10	+ 0.05	+ 0.01	— 0.01	+ 0.08	0.00	— 0.01
10. — 10	— 0.01	0.00	0.00	— 0.01	0.00	0.00
11. — 10	0.00	0.00	— 0.01	0.00	0.00	0.00
3. — 11	— 0.01	+ 0.03	+ 0.03	— 0.02	— 0.04	— 0.04
4. — 11	+ 1.87	— 0.36	— 0.20	— 0.68	+ 0.05	— 0.05

ε V	nz		$2v$		$\frac{u}{\cos i}$	
	cos	sin	cos	sin	cos	sin
5. — 11	−1.88	+0.77	−0.74	−1.81	−0.16	+0.19
6. — 11	−0.12	+0.08	−0.14	−0.26	−0.03	+0.05
7. — 11	+0.11	−0.08	+0.10	+0.13	+0.01	−0.03
8. — 11	−0.06	+0.07	−0.09	−0.08	0.00	+0.02
9. — 11	+0.02	−0.05	+0.07	+0.03	−0.01	−0.01
10. — 11	−0.01	+0.02	−0.04	0.00	0.00	0.00
11. — 11	+0.01	−0.01	+0.01	0.00	0.00	0.00
12. — 11	−0.02	0.00	0.00	−0.01	0.00	0.00
4. — 12	+0.04	−0.05	−0.08	0.00	−0.01	−0.01
5. — 12	+1.22	+0.46	−0.33	+0.16	+0.02	+0.02
6. — 12	+0.10	+0.19	−0.24	+0.13	+0.04	+0.03
7. — 12	−0.05	−0.08	+0.09	−0.06	−0.02	−0.01
8. — 12	+0.04	+0.04	−0.05	+0.05	+0.01	0.00
9. — 12	−0.03	−0.02	+0.03	−0.05	−0.01	0.00
10. — 12	+0.02	+0.01	−0.01	+0.04	0.00	0.00
11. — 12	−0.01	0.00	0.00	−0.01	0.00	0.00
4. — 13	−0.02	−0.03	−0.02	+0.05	−0.04	+0.03
5. — 13	+1.74	−0.48	+0.12	+0.36	0.00	0.00
6. — 13	+0.48	−0.25	+0.26	+0.52	+0.06	−0.08
7. — 13	−0.07	+0.04	−0.04	−0.05	−0.01	+0.01
8. — 13	+0.03	−0.02	+0.03	+0.03	0.00	−0.01
9. — 13	−0.02	+0.02	−0.03	−0.02	0.00	+0.01
10. — 13	+0.01	−0.02	+0.03	+0.01	0.00	0.00
11. — 13	0.00	+0.01	−0.02	0.00	0.00	0.00
12. — 13	0.00	0.00	+0.01	0.00	0.00	0.00
4. — 14	0.00	+0.01	0.00	0.00	0.00	0.00
5. — 14	+0.03	−0.07	−0.05	0.00	−0.01	−0.01
6. — 14	+0.06	+0.17	−0.14	+0.05	+0.02	+0.02
7. — 14	+0.01	+0.02	−0.04	+0.02	+0.01	0.00
8. — 14	−0.01	−0.02	+0.02	−0.01	−0.01	0.00
9. — 14	+0.01	+0.01	−0.01	+0.02	0.00	0.00
10. — 14	−0.01	−0.01	+0.01	−0.02	0.00	0.00
11. — 14	+0.01	0.00	0.00	+0.01	0.00	0.00
12. — 14	−0.01	0.00	0.00	−0.01	0.00	0.00
5. — 15	+0.01	0.00	0.00	0.00	0.00	0.00
6. — 15	+0.07	−0.02	+0.01	+0.04	0.00	−0.01
7. — 15	+0.04	−0.02	+0.02	+0.05	+0.01	−0.01
8. — 15	−0.01	+0.01	−0.01	−0.01	0.00	0.00
9. — 15	+0.01	−0.01	+0.01	+0.01	0.00	0.00
10. — 15	0.00	+0.01	−0.01	−0.01	0.00	0.00
11. — 15	0.00	−0.01	+0.01	0.00	0.00	0.00
12. — 15	0.00	0.00	−0.01	0.00	0.00	0.00
5. — 16	0.00	−0.01	0.00	0.00	0.00	0.00
6. — 16	+1.66	+7.76	−0.07	0.00	0.00	0.00
7. — 16	+0.26	+0.55	−0.54	+0.25	−0.13	+0.06
8. — 16	−0.01	−0.02	−0.01	+0.01	0.00	0.00

In Folge des kleinen Divisors $3 - 8\mu$ war die Bestimmung der Konstanten sehr mühsam und forderte mehrere Aproximationen. In den zwei ersten habe ich dabei nur mit ganzen Sekunden gerechnet. Die Konstante c ist naturlich unter diesen Umständen sehr unsicher. Ehe ich diese Rechnung fortsetze, was ich beabsichtige, glaube ich, dass es angemessen ist die Glieder mit dem Argumente

$3-8\mu$ eine Revision zu unterwerfen. Ebenso ist eine genauere Berechnung der Koeffizienten mit dem Argumente $6-16\mu$ notwendig, da sie, obwohl vom hohen Grade, doch ziemlich gross sind und daher mit einer Dezimale mehr berechnet werden müssen. Auch die I-Koeffizienten pag. (56) müssen wegen der Änderung von μ korrigirt werden.

Als resultat der Konstantenbestimmung ergab sich

$$k = -154.''71 \qquad l = -14.''39 \qquad c = 51^{\circ}7'31.''$$
$$k_1 = -178.30 \qquad l_1 = +21.15$$
$$k_2 = +485.44 \qquad (n)-n = -0.6714 \qquad C = +126.''32$$

Die Änderung in n bewirkte folgende Änderungen in nz, 2ν und $\frac{u}{\cos i}$:

ε V	$\Delta n\delta z$		$\Delta 2\nu$		$\Delta \frac{u}{\cos i}$	
	cos	sin	cos	sin	cos	sin
1—1				+ 0.18		
2—1				+ 0.03	−0.01	
0—2	− 0.04	− 0.05	+ 0.04		+0.04	+0.06
1—2	− 1.84	− 5.05	+ 1.37	− 0.51		−0.01
2—2	− 0.73	− 1.81	+ 2.06	− 0.83	−0.03	
0—3			+ 0.03	− 0.03	+0.10	−0.05
1—3	+ 8.31	+ 0.33	− 0.09	− 1.25		−0.04
2—3	− 3.92	+ 0.44	− 0.48	− 2.47	−0.17	+0.23
3—3	+ 0.21	+ 0.02	− 0.02	+ 0.15		
2—4	− 0.07	− 0.50	+ 0.19	− 0.03		
3—4	− 0.09	+ 0.11	+ 0.30	− 0.04	−0.02	
4—4	+ 0.03	+ 0.03	− 0.03	+ 0.03		
1—5	− 0.03	+ 0.04	+ 0.03	− 0.06	+0.05	−0.04
2—5	− 8.85	+ 0.46	− 0.16	− 1.19	+0.02	−0.03
3—5	− 2.14	+ 0.57	− 0.59	− 2.25	−0.15	+0.19
4—5	+ 0.14	− 0.05	+ 0.03	+ 0.05		
2—6		− 0.25	− 0.07	+ 0.01		
3—6		+ 0.05	− 0.10	+ 0.02		
4—6		− 0.05	+ 0.06	− 0.03		
3—7			− 0.02	− 0.08		
4—7			− 0.04	− 0.10		
2—8	+ 0.90	+ 0.10	− 2.01	− 0.53	−1.47	−2.02
3—8	−412.5	−3335	−32.93	+ 6.64	−1.04	−0.86
4—8	+ 21.4	+ 63.2	−65.54	+21.76	+6.60	+6.33

Vergleichung mit Elementen oskulirend für 1863 Nov. 14,0 ergab:

Allgem. Störungen $\log r = 0.440525$ $\log \sin b = 9.309454$

Specielle Störungen $\log r = 0.440524$ $\log \sin b = 9.309448$

Zuletzt habe ich zu erwähnen, dass mein Vater die Rechnung bis $\beta^{(3)}$ ausgeführt, die doch von mir revidirt ist.